Atlantic Council

GLOBAL ENERGY CENTER

Climate Leadership in Uncertain Times

Joshua Busby and Nigel Purvis

Climate Leadership in Uncertain Times

Joshua Busby and Nigel Purvis

ISBN-13: 978-1-61977-559-6

Cover: pixabay/Joenomias

September 2018

TABLE OF CONTENTS

INTRODUCTION

It is easy to become cynical and depressed when thinking about humanity's response to the real and growing risk of catastrophic climate change. The science keeps getting clearer. Adverse real-world impacts keep mounting, and political discourse in this area—at least in the United States—remains completely dysfunctional and tribal. While some level of dangerous climate change appears unavoidable, all is not lost. Humanity can keep climate impacts manageable, and create better economic, health, and security outcomes, through proactive common-sense solutions. In fact, much can be done now to strengthen global climate action through international diplomacy—even during the Donald Trump administration.

> "Humanity can keep climate impacts manageable, and create better economic, health, and security outcomes, through proactive common-sense solutions."

Today, international climate cooperation is organized primarily around the 2015 Paris Agreement, which faces headwinds including, but not limited to, President Trump's announced withdrawal of the United States. The agreement's voluntary commitments to reduce emissions, the so-called "Nationally Determined Contributions," were always a down payment on what was needed to avoid dangerous climate change—necessary, but insufficient in themselves. Nearly three years after the agreement was reached in Paris, it remains far from clear that even these modest commitments will be fully implemented.[1]

As the United States has taken a step back, other major emitters are also struggling. After some initial progress, China's emissions have rebounded, raising serious questions about its future trajectory. Internal cleavages and domestic political challenges make European Union leadership a question mark going forward, an issue underscored by Poland's chairmanship of global climate negotiations this year. While the Paris Agreement was built on the premise of a virtuous circle, in which success and sunlight would allow countries to ratchet up their ambitions, there is a real risk of inertia or insufficient progress.

Notwithstanding these obstacles, there is good news. A clean energy transition is under way in the real world. The rise of renewables has created genuine potential for a transformative clean energy economy all around the world. Even in the United States, the impact of the administration's policies, so far, has not been as bad as many have assumed. Buoyed by inexpensive natural gas and the rise of renewables, US emissions continue their downward trajectory—even if projected US emissions remain higher than the country's Paris commitment. With US emissions now accounting for less than 15 percent of global climate pollution, down from about 22 percent in the 1980s, changes in US emissions dictate the global math less than before.

Moreover, despite fears of weakened global resolve, other countries unanimously reaffirmed support for the Paris Agreement in reaction to President Trump's decision to walk away from the pact. International expressions of support, moreover, were augmented by similar statements from governors, mayors, and business leaders across the United States. Globally, the US is isolated—as virtually the only government opposing Paris—and US retrenchment has allowed China and others to burnish their images as global leaders and enhance the legitimacy of their international leadership, at the US expense.

In fact, the foil of the United States continues to serve as a powerful rationale for climate cooperation. In July 2018, China and the EU signed a joint statement reaffirming their support for a successful completion of the rulebook governing the implementation of the Paris Agreement, set to be negotiated in December 2018 in Poland.[2]

Defenders of the Paris Agreement are to be applauded for rallying to its defense. That said, as its supporters

1 For a similar view, see Johannes Urpelainen, "The Paris Agreement's Emissions Goals May Be in Trouble, with or without U.S. Participation," *Washington Post*, June 1, 2018, https://www.washingtonpost.com/news/monkey-cage/wp/2018/06/01/the-paris-agreements-emissions-goals-may-be-in-trouble-with-or-without-u-s-participation/.

2 Joshua S. Hill, "EU & China Sign Joint Statement Increasing Cooperation On Climate Change & Clean Energy," *CleanTechnica*, July 17, 2018, https://cleantechnica.com/2018/07/17/eu-china-sign-joint-statement-increasing-cooperation-on-climate-change-clean-energy/.

French Foreign Minister Laurent Fabius — President of the COP21 climate change conference — raises his hands along with United Nations Secretary-General Ban Ki-moon and French President Francois Hollande on December 12, 2015, after representatives of 196 countries approved a sweeping environmental agreement during a multinational meeting at LeBourget Airport in Paris, France. *Photo credit:* US Department of State

recognize, more must be done internationally to mitigate Trump's damage to international and domestic momentum on climate change and combat weaknesses in global governance. While what is needed to avoid catastrophic climate change—decarbonization by the middle of this century or soon thereafter—is broadly understood, the practical and political steps that could be taken are not.

Perhaps the best way to ratchet up ambition is to disaggregate the climate-pollution problem. Nations may resist the idea of doing more simply to take on a larger share of a global climate goal. But, they are far more likely to agree to specific, manageable actions in particular sectors when the solutions advance other societal goals and are affordable. This report identifies several areas where international diplomacy can help increase global ambition in the coming years, even in the absence of robust action from the US federal government. These areas include: maximizing the potential of so-called natural climate solutions (forests, food, agriculture, and land); building a frontrunner alliance of nations committed to carbon neutrality before mid-century; launching a global compact to scale up electric vehicles; developing an international air pollution initiative, particularly for cities in Asia; and encouraging China to deepen its climate goals at home and abroad. The list is not exhaustive, and merely illuminates the authors' central thesis that international climate cooperation continues to have enormous promise and untapped potential, even in the age of Trump.

PART I: US CLIMATE POLICY UNDER PRESIDENT TRUMP

Under the presidency of Barack Obama, the United States played a vital leadership role in fostering the ideas that became part of the Paris Agreement. Beginning in Copenhagen in 2009, the United States sought to move away from the arrangements in the controversial 1997 Kyoto Protocol, which created pollution reduction commitments for some countries, but not others, and was premised on the idea that nations should negotiate national climate targets at the international level.[3]

> "The 2015 Paris Agreement created expectations of action for all countries, and allowed nations to set their climate targets through domestic political processes rather than international negotiations."

The 2015 Paris Agreement created expectations of action for all countries, and allowed nations to set their climate targets through domestic political processes rather than international negotiations. These Nationally Determined Contributions (NDCs) would be set domestically and periodically updated, with progress reviewed internationally every five years.[4]

The Trump administration's abnegation of US international climate leadership is reminiscent of past US policy changes.[5] The Bill Clinton administration negotiated, concluded, and signed the Kyoto Protocol, only to have the George W. Bush administration withdraw the US signature in 2001. It is regrettable that partisan shifts in domestic politics have yielded inconsistency in US climate diplomacy, making it difficult for other countries to consider the United States a reliable negotiating partner. Despite the administration's public pronouncements, its efforts have been less effective at shifting climate policies than might at first appear. Here is why.

The United States is Still In

During the 2016 presidential campaign, then-candidate Trump made clear his desire to pull the United States out of the Paris Agreement and undermine global support for climate action. He seemingly made good on this promise with a June 2017 press conference in the White House Rose Garden, in which he announced the United States would walk away from the agreement. But, under the rules of the Paris Agreement, the United States cannot formally withdraw until November 2020—the day after the next presidential election.[6]

Thus, the United States is still formally part of the Paris Agreement. Even if President Trump pulls the United States out of Paris in 2020, should another president come into office, he or she will be able to rejoin the Paris Agreement on or after January 20, 2020. Congress has no say in joining, withdrawing from, or rejoining the Paris Agreement; the pact is an executive agreement, not a treaty, and does not require any change in US law to implement. Moreover, and perhaps more importantly, the world continues to move ahead with implementing the Paris agreement, regardless of the United States' position.

3 Joshua W. Busby, *After Copenhagen: Climate Governance and the Road Ahead* (Washington, DC: Council on Foreign Relations, 2010), http://www.cfr.org/publication/22726/after_copenhagen.html; Joshua Busby, "People Think That the Copenhagen Climate Talks Failed. Here's Why They're so Wrong," *Washington Post*, December 2, 2015, https://www.washingtonpost.com/news/monkey-cage/wp/2015/12/02/people-think-that-the-copenhagen-climate-talks-failed-heres-why-theyre-so-wrong/.

4 Robert Falkner, "The Paris Agreement and the New Logic of International Climate Politics," *International Affairs* vol. 92, no. 5, September 2016, pp. 1107–1125, https://doi.org/10.1111/1468-2346.12708; Joshua W. Busby, "After Paris: Good Enough Climate Governance," *Current History* vol. 15, no. 777, January 2016, pp. 3–9, http://www.currenthistory.com/Busby_CurrentHistory.pdf.

5 Johannes Urpelainen and Thijs Van de Graaf, "United States Non-Cooperation and the Paris Agreement," *Climate Policy* 18, no. 7, August 9, 2018, pp. 839–851, https://doi.org/10.1080/14693062.2017.1406843; Joshua W. Busby, "The Hardest Problem in the World: Leadership in the Climate Regime," in Stefan Brem and Kendall Stiles (editors), *The Dispensable Hegemon: Explaining Contemporary International Leadership and Cooperation* (London: Routledge, 2008), pp. 73–104.

6 Joshua W. Busby, "Trump Says Goodbye to the Paris Climate Agreement. Here's What That Means.," *Washington Post* (blog), June 1, 2017, https://www.washingtonpost.com/news/monkey-cage/wp/2017/06/01/trump-says-goodbye-to-the-paris-climate-agreement-heres-what-that-means/?utm_term=.b4e9bd5fc45.

In the meantime, the US government continues to engage in global climate negotiations by sending negotiators to periodic UN climate talks, albeit in smaller numbers than before. Though its leverage is reduced, the US team remains active, and is overseeing discussions on how to create transparency about what nations are actually doing to implement the Paris Agreement and other climate accords.

The Clean Energy Economy Has Momentum

Even though the US stance on climate policy is dramatically weaker than it was three years ago, a clean energy transition is underway. The rise of renewables and the acceleration of low-cost natural gas have put the United States on a downward emissions trajectory. Coal continues to decline, for economic and social reasons. Wind and solar are racing ahead. A combination of trends means that even as the US economy is growing, greenhouse gas emissions are not.

Between 2005 and 2016, total US greenhouse gas emissions fell by 12 percent.[7] Emissions continued to fall in the first year of the Trump administration. Through 2017, energy-related carbon dioxide (CO_2) emissions, which account for more than 80 percent of total greenhouse gas emissions in the United States, fell 14 percent below 2005 levels.[8]

Overall, that means the United States is largely on track to meet the climate goal that President Obama set in Copenhagen in 2009, which was to reduce US emissions 17 percent below 2005 levels by 2020. Despite this current progress, the United States is unlikely to meet its goal in the Paris Agreement for 2025—a 26–28 percent reduction below 2005 levels. Achieving that target was always going to be a heavy lift and would require the adoption of new policies, even beyond those the Obama administration had set in motion. However, the gap between where the United States will be in 2020 or 2025 under Trump vs. Obama may not be as large as many feared.[9] The continued drop in emissions during the first years of the Trump administration suggests there is momentum that the administration will find difficult to undo.

Even when it comes to climate finance, an area where some analysts fear President Trump could cut off funds, his administration has been less successful than many people think. Congress has largely ignored the president's budget requests in a number of areas, appropriating money for clean energy offices at the Department of Energy, and even for international programs.[10]

Funding for clean energy research and development (R&D) is increasing, and funding for climate-related foreign aid has not been reduced as much as many analysts predicted.[11] True, Congress did not provide money for the Intergovernmental Panel on Climate Change or the United Nations Framework Convention on Climate Change (UNFCCC) secretariat in 2017, but these funds were tiny. For example, Bloomberg Philanthropies offered to fill the 2017 US contribution to the UNFCCC by pledging up to $15 million.[12] The US contribution to the Intergovernmental Panel on Climate Change (IPCC)—the scientific body responsible for periodic assessments of climate science—was even less, about $2 million.[13] Other governments offered to provide extra funds for the IPCC to make up for the loss of US support.

The major exception is the Green Climate Fund (GCF), the financial mechanism designated with helping developing countries implement their Paris pledges. President Trump and Congress have stopped new funding to the GCF, including the remaining $2 billion in President Obama's unmet pledge.[14]

7 John Larsen, Kate Larsen, Whitney Herndon, Peter Marsters, Hannah Pitt, and Shashank Mohan, "Taking Stock 2018," *Rhodium Group* (blog), June 28, 2018, https://rhg.com/research/taking-stock-2018/.

8 Seth Whitehead, "EIA: U.S. Carbon Emissions Fall Again in 2017, 'Mainly' Because of Natural Gas," *Energy In Depth* (blog), February 12, 2018, http://eidclimate.org/eia-u-s-carbon-emissions-fall-2017-mainly-natural-gas/.

9 Larsen et al., "Taking Stock 2018." The Rhodium group estimates that under current policy US emissions will be some 15–17 percent below 2005 levels by 2020, but only some 12–20 percent below 2005 levels by 2025.

10 Despite steep proposed cuts from the Trump administration, fiscal year 2018 appropriations for the Office of Energy Efficiency and Renewable Energy, the Advanced Research Projects Agency-Energy (ARPA-E), and the Office of Science all increased from 2017 levels. Emma Foehringer Merchant, "Lawmakers Pass Spending Bill with Funds for Clean Energy," *Greentech Media*, March 28, 2018, https://www.greentechmedia.com/articles/read/lawmakers-pass-budget-appropriations-bill-with-funds-for-clean-energy#gs.t8_8Gfs.

11 Urpelainen and Van de Graaf, "United States Non-Cooperation and the Paris Agreement."

12 Bill Chappell, "Bloomberg Promises $15 Million To Help Make Up for U.S. Withdrawal from Climate Deal," *National Public Radio*, June 2, 2017, https://www.npr.org/sections/thetwo-way/2017/06/02/531238185/bloomberg-promises-15-million-to-help-make-up-for-u-s-withdrawal-from-climate-de.

13 Nick Stockton, "The US Won't Pay for the World's Best Climate Science," *Wired*, August 11, 2017, https://www.wired.com/story/the-us-wont-pay-for-the-worlds-best-climate-science/.

14 The Green Climate Fund (GCF) is the financing body set up after the 2009 Copenhagen climate negotiations to support climate mitigation and adaptation in developing countries. Thus far, it has raised about $10 billion with aspirations to raise some $100 billion by 2020. Green Climate Fund, "Portfolio Dashboard," July 16, 2018, https://www.greenclimate.fund/what-we-do/portfolio-dashboard.

In other areas like contributions to the Global Environment Facility, US appropriations remain pretty much as they were before the Trump administration: $146.6 million in FY 2017 and nearly $140 million for FY 2018.[15] Moreover, while US funding for the multilateral development banks has come down, appropriations for 2018 still exceeded $1.35 billion, and these banks have their own separate climate commitments.

It is true that uncertainty remains about future US financial support for international climate action. Questions remain about whether the Overseas Private Investment Corporation (OPIC) will continue its robust support for renewables. Moreover, the State Department and the United States Agency for International Development (USAID) have some discretion over how their funds are used.[16] Thus far, though, the effects of the Trump administration on US international climate finance are not as bad as many feared.

Governors, Mayors, and Businesses Are Committed

President Trump has triggered a robust response from domestic supporters of the Paris Agreement to do more. Thousands of mayors, governors, business leaders, and others have reaffirmed their support for the Paris Agreement through the bipartisan US Climate Alliance and the We Are Still In coalition.[17] The initiatives account for about half of the US population, and between $6–$9 trillion of the US economy.

These actors have recommitted (or, in some cases, committed for the first time) to serious climate action and are trying to fill in for the absence of robust US federal action through their own policies and investments. Notable among these various actors is the state of California, the fifth-largest economy in the world and host to the Global Climate Action Summit in fall 2018. In 2016, California already reached its 2020 emissions reductions targets, with emissions falling below 1990 levels. Its 2030 emissions target—40 percent below 1990 levels—will be a heavier lift, but other states have joined California to support an ambitious climate agenda, regardless of the administration in power.[18]

While difficult to estimate with precision, the commitments of these various states, cities, and nonstate actors—if fully implemented—could get the United States some 60 percent of the way to its Paris pledge.[19]

Efforts by US companies extend beyond the United States. For example, Google, a member of We Are Still In, pledged in 2010 to procure 100 percent of its electricity through renewables, achieving that goal in 2017 for its operations and data centers worldwide.[20] Apple, for its part, announced a $300 million investment in renewables for ten Chinese suppliers in July 2018.[21] These companies' orientation to clean energy predated the current administration, but President Trump's announcement provided them and others with incentives to sustain their clean energy commitments, and to make new ones.

Deregulation Takes Time

The Obama administration went much further than previous administrations in moving the domestic policy agenda on climate change forward. Stymied by Congress, the administration used executive authority or authority under previous legislation for many of these actions. For example, using existing authority under the Clean Air Act, the Obama administration crafted the Clean Power Plan to regulate carbon as a pollutant and reduce power plant emissions. The

15 The Global Environment Facility (GEF) was established as a pilot managed by the World Bank in 1991. It became independent in 1992, and has since provided nearly $18 billion in grants and leveraged nearly $100 billion in co-finance. Global Environment Facility, "About Us," 2018, https://www.thegef.org/about-us. Rebecca M. Nelson, M*ultilateral Development Banks: U.S. Contributions FY2000-FY2019* (Washington, DC: Congressional Research Service, 2018).

16 Joe Thwaites, "US 2018 Budget and Climate Finance: It's Bad, but Not As Bad As You Might Think," *World Resources Institute* (blog), March 23, 2018, http://www.wri.org/blog/2018/03/us-2018-budget-and-climate-finance-its-bad-not-bad-you-might-think.

17 US Climate Alliance, "Home," https://www.usclimatealliance.org/. The US Climate Alliance includes governors of sixteen states and one US territory. We Are Still In, "About," https://www.wearestillin.com/about. More than 2,800 governors, mayors, businesses, counties, universities, and other actors are part of the We Are Still In coalition.

18 David R. Baker, "California Slashes Emissions, Hits Major Greenhouse Gas Goal Years Early," *San Francisco Chronicle*, July 12, 2018, https://www.sfchronicle.com/business/article/California-hits-2020-greenhouse-gas-reduction-13066821.php.

19 Mary Anne Hitt and Bruce Nilles, "Pathway to Paris," *Sierra Club* (blog), March 8, 2017, http://www.sierraclub.org/compass/2017/03/pathway-paris. The America's Pledge initiative, an effort led by Governor Jerry Brown of California and former New York Mayor Mike Bloomberg, will further quantify these efforts in a report to be released in September 2018. America's Pledge, press release, "America's Pledge Outlines Bottom-Up Opportunity Agenda for U.S. State, City and Business Action on Climate," July 17, 2018, https://www.americaspledgeonclimate.com/news/americas-pledge-outlines-bottom-opportunity-agenda/.

20 Roberto Rodriguez Labastida, "Google Has Reached 100% Renewable Energy, So I'm Issuing A New Challenge," *Forbes*, April 19, 2018, https://www.forbes.com/sites/pikeresearch/2018/04/19/google-has-reached-100-renewable-energy/#3df4a12d57e3.

21 Apple, press release, "Apple Launches New Clean Energy Fund in China," July 12, 2018, https://www.apple.com/newsroom/2018/07/apple-launches-new-clean-energy-fund-in-china/.

administration also negotiated an agreement with automakers to improve fuel efficiency. It formalized rules to limit emissions from methane leakage and other sources of pollution. The Trump administration has initiated efforts to repeal or weaken those policies and many other Obama-era regulations.[22]

President Trump's efforts to roll back energy and environmental policies and deregulate the US economy have, thus far, made only modest progress. Deregulation takes time, and US courts are likely to stop many rollbacks because the administration's political motivations have been transparent in interpretation of statutes that require science-based decisions.[23]

Moreover, the Environmental Protection Agency (EPA) still faces a legal mandate to address global warming. Just before EPA Administrator Scott Pruitt stepped down in July 2018, draft rules were submitted to the White House to regulate emissions from power plants, and were publicly announced by EPA in August as the Affordable Clean Energy Rule (ACE). These rules were thought to be less stringent than Obama's Clean Power Plan, and though they do not require wider systemic change, the rules still will likely require some modest upgrades in coal-plant efficiency.[24]

In the wake of Pruitt's departure, Acting Administrator Andrew Wheeler will likely continue to pursue a hardline deregulatory agenda, though perhaps with more finesse than his predecessor. Given his previous background as a coal lobbyist, there is reason to think so. Also, with his prior background at the EPA, he might prove to be a more effective change agent than Scott Pruitt. That said, Wheeler has made moves to be more conciliatory and consultative, with uncertain implications for the overall policy outlook in the climate space.[25]

Both legal changes and the process of public comment before final rulemaking will extend the implementation timeline of these deregulatory moves, by which time the midterm elections and other political changes might change the US climate policy outlook once again.

Companies understand this, and most are making investment decisions premised on the assumption that some form of climate regulations will remain in place, although some corporations, including but not limited to coal companies, are actively backing President Trump's deregulatory agenda through their lobbying, political giving, and public communications.

22 The effort to phase down hydrofluorocarbons (HFCs) through the Kigali amendment to the Montreal Protocol is one policy area in which the Trump administration has not tried to withdraw Obama-era climate commitments. However, it has yet to submit the amendment to the Senate for advice and consent.

23 Coral Davenport, "Trump's Environmental Rollbacks Were Fast. It Could Get Messy in Court," *New York Times*, January 31, 2018, https://www.nytimes.com/2018/01/31/climate/trump-zinke-environmental-rollback.html; Coral Davenport and Lisa Friedman, "In His Haste to Roll Back Rules, Scott Pruitt, E.P.A. Chief, Risks His Agenda," *New York Times*, April 7, 2018, https://www.nytimes.com/2018/04/07/climate/scott-pruitt-epa-rollbacks.html.

24 Lisa Friedman and Brad Plumer, "E.P.A. Drafts Rule on Coal Plants to Replace Clean Power Plan," *New York Times*, July 5, 2018, https://www.nytimes.com/2018/07/05/climate/clean-power-plan-replacement.html.

25 Don Hopey, "Acting U.S. EPA Administrator Wants to 'Depoliticize' Environmental Issues," *Pittsburgh Post-Gazette*, July 16, 2018, http://www.post-gazette.com/news/environment/2018/07/16/Acting-U-S-EPA-administrator-Andrew-Wheeler-wants-to-depoliticize-environmental-issues/stories/201807160182; Marianne Lavelle, "6 Ways EPA's New Leader, a Former Coal Lobbyist, Could Shape Climate Policy," *Inside Climate News*, July 7, 2018, https://insideclimatenews.org/news/07072018/epa-andrew-wheeler-trump-climate-policy-coal-lobbyist-auto-emissions-methane-science-clean-power-plan-pruitt.

PART II: LEADERSHIP POTENTIAL AROUND THE WORLD

These observations suggest that a four-year Trump presidency, though difficult and damaging, may not be the dead end many fear, but merely a detour in the trajectory of US climate policy.

In the meantime, questions remain. Can other actors step up to provide meaningful climate leadership in the absence of the United States? And what is needed to close the leadership gap?

Leadership is required on several fronts. Nations need to do more to reduce greenhouse gas pollution. They need to mobilize trillions of dollars in public and private finance to deliver the clean economy. And they also need to develop a robust system that ensures transparency about what nations are doing to ensure political accountability and economic fairness.

People have looked to major powers like China, the European Union, and India to lead in these areas. For a variety of reasons, the path to leadership for each of these powers remains full of obstacles. Meanwhile, a number of other countries, subnational actors, and nonstate actors are pressing for more ambition to address climate change.

Mixed Signals from China

China is now the world's largest emitter of greenhouse gases, a designation that comes with increased expectations of action and leadership to restrain those emissions. Moreover, with China playing an expansive role as provider of overseas finance, much has been written about whether those funds will support carbon-intensive projects or help hasten a clean energy transition. On both dimensions, the picture is mixed.

China's emissions tripled between 2000 and 2012, and it overtook the United States as the world's largest emitter in 2006.[26] By 2016, China's emissions accounted for 28 percent of the global total—nearly twice as much as the second-largest emitter, the United States.[27] Slowing coal use, and aggressive measures to shut down dirty, inefficient factories, generated considerable optimism that China's emissions peaked in 2016, well before the 2030 target established by the Chinese government.[28]

However, over the last year, there have been numerous signs that China's coal use and emissions have risen again. While China's renewables scale-up continues, it is an open question whether the recent uptick in emissions is a temporary aberration or a return to the previous trend.[29] These mixed signals and policy unevenness show up in other ways. Even as China addressed pollution by deepening its commitment to nuclear energy, it has also scaled back its subsidies for solar, potentially undermining its own renewables build-out.[30] Moreover, there remains considerable concern that even if China succeeds in controlling its emissions at home, it might exacerbate emissions elsewhere through its overseas finance, namely through the Asian Infrastructure Investment Bank (AIIB) and the Belt and Road Initiative, China's effort to knit economies together largely through infrastructure investments in Asia.

While the AIIB has added an environmental screen to its portfolio, worries remain.[31] The AIIB apparently supported a coal-fired cement works in Myanmar through an intermediary.[32] Similar concerns have been issued for

26 Edward Wong, "China Is a Climate Leader but Still Isn't Doing Enough on Emissions, Report Says," *New York Times*, July 20, 2018, https://www.nytimes.com/2018/07/19/world/asia/china-climate-change-report.html.

27 Global Carbon Project, "Global Carbon Budget," November 13, 2017, http://www.globalcarbonproject.org/carbonbudget/index.htm.

28 Edward Wong, "China's Carbon Emissions May Have Peaked, but It's Hazy," *New York Times*, April 3, 2016, https://www.nytimes.com/2016/04/04/world/asia/china-climate-change-peak-carbon-emissions.html.

29 Lucy Hornby and Leslie Hook, "China's Carbon Emissions Set for Fastest Growth in 7 Years," *Financial Times*, May 29, 2018, https://www.ft.com/content/98839504-6334-11e8-90c2-9563a0613e56.

30 Anthony Kleven, "China's Nuclear Energy Gambit," *Diplomat*, June 29, 2018, https://thediplomat.com/2018/06/chinas-nuclear-energy-gambit/; Lucy Hornby and Leslie Hook, "China's Solar Desire Dims," *Financial Times,* June 8, 2018, https://www.ft.com/content/985341f4-6a57-11e8-8cf3-0c230fa67aec.

31 Basten Gokkon, "'Single-Minded Determination': China's Global Infrastructure Spree Rings Alarm Bells," *Mongabay*, July 17, 2018, https://news.mongabay.com/2018/07/single-minded-determination-chinas-global-infrastructure-spree-rings-alarm-bells/.

32 Petra Kjell, "Why Is the World's Newest Development Bank Investing in Coal despite Its Green Promise?" *Climate Home News*, June 21, 2018, http://www.climatechangenews.com/2018/06/21/worlds-newest-development-bank-invests-coal-despite-green-promise/.

A coal-fired power plant in Shuozhou, Shanxi, China. *Photo credit:* Wikimedia/Kleineolive (https://creativecommons.org/licenses/by/3.0/deed.en)

the wider Belt and Road Initiative.[33] Moreover, Chinese firms are financing a coal-burning power plant in Lamu, Kenya, stoking fears that carbon-intensive Chinese firms will compensate for diminished opportunities at home by investing overseas (possibly with state support).[34] Even as China is shutting down many of its older, inefficient coal plants, as of 2017 it had plans to build as many as seven hundred new coal plants at home and abroad.[35]

Perhaps the most important area where China has a leadership role to play is in co-chairing (with the United States) the working group on transparency measures as part of the Paris rulebook. This necessitates a clearer understanding of the role China seeks to play in the upcoming negotiations in Poland. China's delegation has pursued "bifurcation" in reporting standards for developed and developing countries, with less-stringent requirements for the latter, something that the Obama administration vigorously sought to avoid.[36] Given its emissions, China is central to the mitigation challenge, and the Paris Agreement—based on voluntary country targets—depends almost entirely upon sunlight and transparency mechanisms to succeed.[37]

33 Jennifer Morgan, "How China's Belt and Road Initiative Can Get a Green Push from the Asian Infrastructure Development Bank," *South China Morning Post*, June 25, 2018, https://www.scmp.com/comment/letters/article/2152288/how-chinas-belt-and-road-initiative-can-get-green-push-asian.

34 Somini Sengupta, "Why Build Kenya's First Coal Plant? Hint: Think China," *New York Times*, March 1, 2018, https://www.nytimes.com/2018/02/27/climate/coal-kenya-china-power.html.

35 Hiroko Tabuchi, "As Beijing Joins Climate Fight, Chinese Companies Build Coal Plants," *New York Times*, January 20, 2018, https://www.nytimes.com/2017/07/01/climate/china-energy-companies-coal-plants-climate-change.html.

36 Sara Stefanini and Kalina Oroschakoff, "China, Europe Climate Buddy Act Flounders," *Politico*, November 15, 2017, https://www.politico.eu/article/china-europe-climate-buddy-act-flounders/; Edward Wong, "China Wants to Be a Climate Change Watchdog, but Can It Lead by Example?" *New York Times*, January 10, 2017, https://www.nytimes.com/2017/01/10/world/asia/china-wants-to-be-a-climate-change-watchdog-but-cant-yet-lead-by-example.html.

37 Todd Stern, "The Future of the Paris Climate Regime," *Brookings* (blog), April 11, 2018, https://www.brookings.edu/on-the-record/the-future-of-the-paris-climate-regime/.

European Union: 99 Problems

As with the United States, declining emissions in Europe make the EU less central to climate-mitigation efforts going forward. In 2016, the EU-28 was responsible for 10 percent of global CO_2 emissions.

While the European Union and its member states, such as France in particular, have stepped forward to reaffirm their support for the Paris Agreement, the EU faces a number of challenges and internal disagreements that may make it difficult for the EU to play a central leadership role going forward.

Poland, the host for this year's global climate-negotiating session, is less committed to climate goals than other member states. Germany's Angela Merkel is weakened politically, with strong divisions within her party over immigration. After coalition talks to partner with the Greens and Free Democrats failed, Merkel has had to continue her coalition government with the Social Democrats, who have a strong pro-coal wing to placate. The UK is leaving the EU altogether, making it a more peripheral player, despite its success in reducing emissions.

The EU has articulated robust long-term goals, even strengthening them in recent months.[38] The EU's 2030 goal is to reduce emissions at least 40 percent below 1990 levels. As of 2016, emissions were 23 percent below 1990 levels. However, Europe's ability to achieve these targets is unclear, with a number of countries not on track to meet their 2020 emissions-reductions targets.[39] Between 2014–2016, EU-28 emissions of carbon dioxide rose 1.26 percent, with Spain and France posting large emissions increases of more than 3 percent, and Italy more than 4.7 percent. Germany and Poland also experienced emissions growth, of more than 1.3 and 2.7 percent, respectively.[40]

Germany, for example, will miss its 2020 commitment to reduce greenhouse gases by 40 percent below 1990 levels by 8 percentage points. While Germany has made considerable progress in scaling up renewables, the decision to phase out nuclear power in the wake of the 2011 Fukushima disaster has made further gains more difficult.[41] Transport emissions, in particular, have continued to increase.[42]

These and other problems lead knowledgeable observers like the University of Zurich's Axel Michaelowa to conclude: "While some European regions such as Scandinavia can still claim to be climate policy leaders, the EU as a whole unfortunately seems unable to regain this role."[43] Climate action remains central to the national identities, cultures, and foreign policies of many nations in Western Europe. While Germany, France, the UK, and Scandinavian nations will likely find a way to lead again at home and abroad, this may not happen until around 2020.

India: Too Much to Ask?

India faces a different challenge than European countries, as it still has hundreds of millions of people who lack access to electricity. India's per-capita energy use is orders of magnitude smaller than Europe's, let alone that of the United States. Despite having more than 17 percent of the world's population, India was responsible for only 7 percent of carbon dioxide emissions in 2016. So, even though India is dramatically scaling up the share of renewables in its energy production, it is unlikely to fill the global leadership void on climate change for now.[44]

38 In July 2018, the EU agreed on new 2030 targets for renewables and energy efficiency, of 32 percent and 32.5 percent respectively. Frédéric Simon, "Half of Member States Back Stronger EU Climate Action," *Climate Home News*, June 26, 2018, http://www.climatechangenews.com/2018/06/26/half-member-states-back-stronger-eu-climate-action/.

39 Dave Keating, "Winners and Losers in the Race to Meet the Paris Climate Goals," *Deutsche Welle*, June 18, 2017, https://www.dw.com/en/winners-and-losers-in-the-race-to-meet-the-paris-climate-goals/a-44277459.

40 Greet Janssens-Maenhout, Monica Crippa, Diego Guizzardi, Marilena Muntean, Edwin Schaaf, Frank Dentener, Peter Bergamaschi, Valerio Pagliari, Jos G. J. Oliver, Jeroen A. H. W. Peters, John A. van Aardenne, Suvi Monni, Ulrike Doering, and A. M. Roxana Petrescu, "EDGAR v4.3.2 Global Atlas of the Three Major Greenhouse Gas Emissions for the Period 1970 – 2012," *Earth System Science Data Discussions*, August 28, 2017, pp. 1–55, https://doi.org/10.5194/essd-2017-79. The UK did post a 10-percent drop during this period, perhaps a function of a slowing economy after the Brexit vote.

41 Germany is still trying to figure out how to exit from coal and provide some social protection for affected communities. In 2018, the government established a commission to explore the process with the goal to identify a time frame and targets by the end of the year.

42 Solia Apparicio, "Germany to Miss 2020 Climate Target, Government Concedes in Official Report," *Climate Home News*, June 12, 2018, http://www.climatechangenews.com/2018/06/12/germany-miss-2020-climate-target-government-concedes-official-report/.

43 Axel Michaelowa, "Can the EU Regain Its International Climate Policy Leadership Lost in Copenhagen?" *Duck of Minerva* (blog), November 12, 2017, http://duckofminerva.com/2017/11/can-the-eu-regain-its-international-climate-policy-leadership-lost-in-copenhagen.html.

44 Joshua W. Busby and Sarang Shidore, "Still Shining? Our Third Annual Review on Solar Scale-up in India," *Council on Foreign Relations* (blog), February 20, 2018, https://www.cfr.org/blog/still-shining-our-third-annual-review-solar-scale-india. For a more optimistic take, see Arunabha Ghosh, "Here's Looking at You, India," *Indian Express*, June 3, 2017, http://indianexpress.com/article/opinion/columns/paris-climate-agreement-heres-looking-at-you-india-4686501/.

In 2015, India partnered with France to form the International Solar Alliance (ISA), the first intergovernmental organization to be headquartered in India. Among other activities, the ISA seeks to mobilize capital and pool risks for solar-rich, but finance-poor, developing countries. That effort is new, and whether it will succeed remains to be seen.

Unlike China, India is largely in need of, rather than a provider of, foreign finance. Like China, India has also supported bifurcated transparency standards, whereby poorer countries like India would not be expected to report as transparently to the international community as developed nations.[45]

Middle Powers, Subnational Actors, and Nonstate Actors

Luckily, a number of middle powers, subnational actors, and nonstate actors have stepped into the void to serve as ambassadors for high ambition on climate. In June 2018, twenty-three countries, including several in Europe, Latin America, Africa, and the South Pacific, called for greater ambition and faster, steeper emissions cuts and NDCs.[46]

Subnational actors have also stepped forward. Perhaps the most visible is the state of California, host to the 2018 Global Climate Action Summit, but the commitments extend beyond California and the United States. With a majority of the world's population now living in cities, mayors around the world have also taken action to make significant climate commitments, anchored by institutions such as C40, an alliance of more than ninety cities with a combined population in excess of six hundred and fifty million.[47]

As mentioned before, hundreds of leading companies around the world have also reaffirmed their support for the Paris Agreement, and have announced additional goals, targets, and investments that would hasten their companies' transitions to clean energy sources and reduced climate footprints. Mission Innovation, a new public-private partnership to encourage clean energy innovation, was announced at the 2015 Paris climate negotiations and generated considerable excitement.[48] With the support of Bill Gates and other wealthy philanthropists, Mission Innovation had the potential to unlock billions in private capital for next-generation technologies. However, it is unclear if that effort is living up to the high hopes many had for it.

"The Paris Agreement reaffirmed the target of keeping global temperature averages from rising 2 degrees Celsius above pre-industrial levels and established a more aspirational goal of preventing a 1.5 degrees Celsius increase over the twenty-first century."

Certainly, many of the leading environmental nongovernmental organizations (NGOs) have been pressing states and private actors to increase their ambition and commit to mid-century decarbonization, as well as a range of goals and commitments in particular areas such as electricity, transportation, and beyond.

These actions by frontrunner actors, individually and collectively, all are important markers of what needs to happen. However, evidence suggests that collective commitments and actions to date are far from what is needed to avoid dangerous climate change, suggesting new diplomatic efforts are required.

The Paris Agreement reaffirmed the target of keeping global temperature averages from rising 2 degrees Celsius above pre-industrial levels and established a more aspirational goal of preventing a 1.5 degrees Celsius increase over the twenty-first century. The Paris Agreement also reaffirmed the commitment, made by rich countries at the 2009 Copenhagen climate negotiations, to mobilize $100 billion per year in public and

45 Government of India, "India's Submission on APA Agenda Item 5—Modalities, Procedures And Guidelines For The Transparency Framework For Action And Support Referred To In Article 13 Of The Paris Agreement," 2017, http://www4.unfccc.int/Submissions/Lists/OSPSubmissionUpload/176_358_131540079925814293-INDIA-%20Transparency%20submission%20final.pdf.

46 Signatories included Argentina, Canada, Chile, Colombia, Costa Rica, Denmark, Ethiopia, Fiji, Finland, France, Germany, Maldives, Marshall Islands, Mexico, Monaco, the Netherlands, New Zealand, Norway, Rwanda, Saint Lucia, Spain, Sweden, and United Kingdom. Climate Action Network, press release, "Climate Action Network Welcomes the Declaration by 23 Nations to Step up Their Climate Ambition," June 22, 2018, http://www.climatenetwork.org/press-release/climate-action-network-welcomes-declaration-23-nations-step-their-climate-ambition.

47 C40, "About," https://www.c40.org/about.

48 Mission Innovation, "About Mission Innovation," http://mission-innovation.net/.

private resources to support climate mitigation and adaptation in the developing world.

On both of these critical dimensions, action to date is falling short of what is needed.

On mitigation, the 1.5- and 2- degree temperature goals have encouraged scholars and practitioners to estimate the emissions trajectories needed for success. In turn, that has led to estimates of the total carbon budget of greenhouse gases that can be emitted over the coming decades and still meet those temperature goals.

The United Nations Environment Programme (UNEP) has issued an annual gap report that estimates the distance between pledged commitments and what would be required to stay within the 1.5- and 2-degree targets. In its 2017 report, UNEP estimated that the gap between what the world is doing and what it needs to have a chance to stay below the 2-degrees target is between 11 and 13.5 gigatons of CO_2 equivalent—depending on whether the estimate used countries' conditional or unconditional commitments under the Paris Agreement. At this rate, global emissions could exhaust 80 percent of the available carbon budget as soon as 2030.[49]

Analysts have provided similar assessments of climate finance and the goal of $100 billion by 2020. One challenge is that observers often misunderstand that this was not a pledge by governments to provide $100 billion in climate finance through official development assistance. Thus, efforts to evaluate whether rich countries are making good on this pledge must also calculate the amount of climate finance that private-sector actors are providing. One of the key challenges is assessing what counts as climate finance, since cash-strapped donor governments have increasingly sought to rebrand existing development assistance as climate-related. Advocates for developing countries, particularly those concerned about adaptation, have pressed for additionality—that climate finance be new money, rather than relabeling of existing streams of finance. They have also noted that adaptation—that is, preparing for the consequences of climate change—gets very little of the climate finance that is provided, as low as 20 percent.

While difficult to determine with precision, estimates suggest that the $100 billion pledge will be hard to fulfill by 2020. A 2018 Oxfam study estimated that some $48 billion in climate finance was provided by donor governments in 2015–2016; in its more conservative accounting, the net climate-specific component was less than half that amount. Previous estimates by the Organization for Economic Cooperation and Development (OECD) suggested that private funding would account for at least one quarter of the $100 billion. Oxfam noted there is no agreed-upon standard for how to count private finance.[50]

Even that $100 billion pledge is likely orders of magnitude lower than what is ultimately needed. Estimates suggest developing countries will need between $140 and $300 billion dollars per year by 2030 to minimize the damages from climate change, let alone the tens of billions that will be required for a clean energy transition.[51]

49 Conditional targets reflect what states will do if other states act and unconditional targets reflects what states are prepared to do regardless. UNEP, "Emissions Gap Report 2017," United Nations Environment Programme, 2017, http://www.unenvironment.org/resources/emissions-gap-report.

50 Oxfam noted least-developed countries received less than 20 percent of this money, and there was heavy reliance on loans rather than grants. Tracy Carty, Armelle Le Comte, and Alpaslan Özerdem, *Climate Finance Shadow Report 2018: Assessing Progress Towards the $100 Billion Commitment* (Oxford, UK: Oxfam International, 2018), https://policy-practice.oxfam.org.uk/publications/climate-finance-shadow-report-2018-assessing-progress-towards-the-100-billion-c-620467.

51 United Nations Environmental Programme, *The Adaptation Finance Gap Report 2016* (Nairobi: UNEP, 2016).

PART III: PIECE BY PIECE—A THEORY OF CHANGE

Before identifying what strategies might be pursued to increase collective ambition toward both climate mitigation and finance goals, it is helpful to flesh out how policy change might come about. That understanding will inform a subsequent assessment of what diplomatic initiatives could prove effective.

> "Policymakers and diplomats need to continue moving away from the idea of a single global negotiation over emissions levels, and toward a multi-pronged approach."

Crowding in Participation

The 1997 Kyoto Protocol approach was abandoned because its structure—with commitments for some and not others—discouraged state participation and action. The hardest part was just getting started. The promise of the Paris Agreement was that all actors pledged to make commitments, and the hope was that ambition would ratchet up over time, as states gained experience and confidence that they and others were on the right path.

Since Paris, subsequent climate negotiations have also broken new ground in trying to encourage private-sector and local participation by subnational and nonstate actors through efforts like the Nonstate Actor Zone for Climate Action (NAZCA) dialogue, a registry for nonstate actors to indicate their climate commitments and actions.

Disaggregate the Climate Problem

Perhaps the best way to ratchet up ambition is to disaggregate the climate-pollution problem. The climate challenge should not be treated as merely one thing. It is a power-sector problem, an industry-emissions issue, a transportation problem, a forest and land-use problem, and so forth.

This movement to problem-specific actions was underpinned by a recognition that climate change is not one problem but many, requiring discrete solutions and forums for different pieces of the overall problem.[52]

Nations may resist the idea of doing more simply to take on a larger share of a global climate goal. But, they are far more likely to agree to specific, manageable actions in particular sectors when the solutions advance other societal goals and are affordable. Policymakers and diplomats need to continue moving away from the idea of a single global negotiation over emissions levels, and toward a multi-pronged approach.

For example, some of the most promising efforts to address climate change of late have involved sector-specific efforts to address refrigerants, forests, aviation, shipping, and fossil fuel subsidies.[53]

In 2016, countries finalized the Kigali Amendment to the Montreal Protocol, the 1980s treaty that successfully repaired the hole in the ozone layer. Through the amendment, nations established a timeline for phasing down hydrofluorocarbons (HFCs), super-polluting refrigerants used in vehicles, homes, and factories.[54] Efforts to address international aviation and shipping emissions have recently moved forward at the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), respectively, though much will depend on how these agreements are

52 This regime fragmentation was described and affirmed by Robert O. Keohane and David G. Victor, "The Regime Complex for Climate Change," *Perspectives on Politics* vol. 9, no. 1, 2011, pp. 7–23.

53 Nisha Krishnan and Joshua W. Busby, *Key Regional Actors and Sector Opportunities for International Climate Change Cooperation* (Muscatine, IA: The Stanley Foundation, September 2015), https://www.stanleyfoundation.org//resources.cfm?id=1569.

54 Coral Davenport, "Nations, Fighting Powerful Refrigerant That Warms Planet, Reach Landmark Deal," *New York Times*, October 15, 2016, https://www.nytimes.com/2016/10/15/world/africa/kigali-deal-hfc-air-conditioners.html.

implemented.[55] The phaseout of fossil-fuel subsidies has been tackled by the Group of Twenty (G20), though with limited results to date.[56]

The 2014 New York Declaration on Forests (NYDF) sought to move private-sector supply chains to move toward zero deforestation. Parallel efforts on tropical deforestation have moved forward, with mixed success, through bilateral and multilateral partnerships, many of them led by Norway.[57]

Sectoral policies also have some virtues when it comes to building domestic political support in different country contexts. As Adrien Vogt-Schilb and Stephane Hallegatte argue in a piece for the Inter-American Development Bank:

> "Sectoral targets facilitate the design of climate policies since the policy instruments to enforce them, such as performance standards on new vehicles or renewable portfolio standards, can be more easily negotiated with civil society, academia and industry stakeholders than economy-wide targets and instruments."[58]

Sectoral policies may also produce co-benefits, such as jobs and clean air, and create new economic constituencies that support climate action.[59]

That said, not all sectors are equally conducive to action. Work on sectoral climate mitigation in India and China suggests fragmented sectors, like buildings and agriculture, may be especially difficult for organizing collective action, even where savings can be realized. This insight suggests it is beneficial to look for opportunities where emissions are concentrated among a few players. That means focusing on the major economies and the sectors responsible for the bulk of emissions, and also looking for sectors where a few key actors produce most of the emissions.[60]

55 A compromise on aviation emissions and carbon offsets was reached in June 2018 at ICAO. Annie Petsonk, "ICAO Adopts Crucial Rules for Implementing 15-Year Aviation Climate Agreement," *Environmental Defense Fund*, June 27, 2018, https://www.edf.org/media/icao-adopts-crucial-rules-implementing-15-year-aviation-climate-agreement. An agreement at the IMO on shipping emissions was reached in April 2018. Anna Hirtenstein and Jeremy Hodges, "Nations Strike Historic Deal to Curb Shipping Emissions," *Bloomberg*, April 13, 2018, https://www.bloomberg.com/news/articles/2018-04-13/nations-strike-historic-deal-to-curb-shipping-industry-emissions.

56 "G-20 to Phase Out Super Greenhouse Gas, Fossil Fuel Subsidies," *Environment News Service*, September 6, 2013, http://ens-newswire.com/2013/09/06/g-20-to-phase-out-super-greenhouse-gas-fossil-fuel-subsidies/.

57 United Nations, "New York Declaration on Forests," 2014, http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/09/FORESTS-New-York-Declaration-on-Forests.pdf?&utm_source=CIFOR+blog&utm_medium=Further+reading&utm_campaign=Blog+feature.

58 Adrien Vogt-Schilb and Stephane Hallegatte, *Climate Policies and Nationally Determined Contributions: Reconciling the Needed Ambition with the Political Economy* (Washington, DC: Inter-American Development Bank, 2017), p. 3, https://doi.org/10.18235/0000714.

59 Urpelainen and Van de Graaf, "United States Non-Cooperation and the Paris Agreement," pp. 846–847.

60 Joshua W. Busby and Sarang Shidore, "When Decarbonization Meets Development: The Sectoral Feasibility of Greenhouse Gas Mitigation in India," *Energy Research & Social Science* vol. 23, January 2017, pp. 60–73, https://doi.org/10.1016/j.erss.2016.11.011; Joshua Busby, Xue Gao, and Sarang Shidore, "Turning the Carbon Supertanker: Sectoral Feasibility of Climate Change Mitigation in China," *Energy Research & Social Science* vol. 37, 2018, pp. 198–210, https://doi.org/10.1016/j.erss.2017.09.003.

PART IV: AREAS FOR DIPLOMATIC PROGRESS

Some of these efforts, notably surrounding deforestation, have a track record. Many of the others are quite new. The question then becomes in what other sectors or areas are large emissions reductions possible.

It is beyond the scope of this report to comprehensively document the size of emissions reductions in different potential areas. Other analytical projects have evaluated what is theoretically possible and identified key areas for progress.

Appendix A summarizes six studies that have identified areas with potential large-scale emissions reductions, and those of strategic priority. Some are academic projects, others are foundations' strategic funding priorities, and others are organizing vehicles for action.[61]

Possibilities for Strategic Priorities

These different assessments share certain findings. Many studies highlight the enormous potential for reducing emissions and sequestering carbon through interventions relating to forests, agriculture, and land management. There is also consensus on increasing and deepening the scale-up of renewable energy and speeding up the electrification of the transport sector.

Several studies mention the prospect of large gains from phase-out and management of short-lived gases like HFCs and methane. Other highlighted solutions include energy-efficiency improvements, particularly in the building and appliance sectors, where investments are likely to improve economic growth and have very short payback periods. Another area is the potential for reducing climate emissions by shifting to healthier diets with more plants and vegetables, as well as reducing unnecessary and wasteful consumption. A final arena is the scope for lower emissions through the education of girls and the provision of family-planning services.

A Possible Diplomatic Agenda

All of the ideas listed above deserve strong international and diplomatic support. Some areas, however, are already in the spotlight for international cooperation.

Girls' education and family planning are extremely important avenues for progress in international development. Fortunately, the Sustainable Development Goals process features those issues centrally. It is harder to see how other areas could be globalized, because they may currently be seen as local issues, where the scope for international efforts appears less obvious, beyond simply sharing best practices. Building codes and energy-efficiency standards for appliances might be examples of issues that would be hard to drive through international diplomacy at this time.

The pages that follow explore the current state of play in five areas as a down payment toward a new diplomatic strategy:

- maximizing the potential of so-called natural climate solutions (forests, food, agriculture and land)
- building a frontrunner alliance of nations committing to carbon neutrality before mid-century
- launching a global compact to scale up electric vehicles
- developing an international air pollution initiative, particularly for cities in Asia
- encouraging China to deepen its climate goals at home and abroad

Maximizing Natural Climate Solutions

Securing the Earth and humanity's long-term future depends on rapidly reshaping how society stewards land and natural resources. Natural climate solutions—stopping deforestation, promoting forest restoration, climate-smart agriculture, healthy dietary choices, and other common-sense decisions that impact lands—can provide at least 30 percent of needed climate action over the next decades, lift a billion people out of poverty, create eighty million jobs, and add an additional $2.3 trillion in productive growth.

Forests alone could provide nearly half of these climate benefits, if the world only stopped deforestation, enhanced forest restoration, and protected forest soils and peatlands—as it agreed to do by 2030 in the 2014 New York Declaration on Forests (NYDF). Tragically, that opportunity has not yet been seized. Natural

61 Sources include America's Pledge, Kuramochi et. al, Vogt-Schilb and Hallegatte, Drawdown, the Hewlett Foundation, and ClimateWorks.

climate solutions receive a tiny fraction of the attention and funding afforded other vital, but more widely understood, climate efforts, such as renewable energy.

This agenda has a long history, but it needs new energy and political will. In the late 1980s, concern about deforestation rose alongside fears of global warming. However, in those days, the issues were seen as separate. By the 2000s, emissions from deforestation and land degradation were recognized as an important source of greenhouse gas emissions—as much as 20 percent of global emissions.

Beginning more than a decade ago, considerable enthusiasm emerged for so-called REDD+ schemes to reduce deforestation as a low-cost way of avoiding greenhouse gas emissions.[62] Between 2007 and 2015, negotiators developed a framework agreement that would allow forest conservation to formally be part of the climate convention.[63] As a result of this work, forests are the only sector that has its own chapter in the Paris Agreement. The idea behind REDD+ is to change countries' and local actors' incentives to conserve forests, by paying them not to cut forests down. A decade ago, mechanisms at the World Bank—including the Forest Carbon Partnership Facility—were set up to help countries get ready for this approach, and to ultimately finance forest conservation.[64]

Two other developments have been important in this space. First, in 2010, the Consumer Goods Forum, an annual meeting of leading companies, sought to influence private actors and supply chains for beef, palm oil, soybeans, pulp, and paper. Participants endorsed a pledge of zero net deforestation for those commodities by 2020.[65]

Second, with greater public access to satellite monitoring, the capacity to observe deforestation has vastly improved, leading to better, fine-grained information that is regularly updated. Efforts like Global Forest Watch, launched in 2014, are useful tools for regulators, corporate executives, and advocates alike.[66] New tools are emerging each year that help better identify the companies and individuals responsible for deforestation.

In 2014, then-UN Secretary General Ban Ki-moon used his convening power to organize a climate summit. Perhaps the most consequential outcome of this gathering of world leaders—including heads of state, and private- and nonprofit-sector leaders—was the NYDF, which established ambitious goals to stop and reverse deforestation. These included cutting forest loss in half by 2020 and ending it in 2030, with additional goals for eliminating forest loss in agricultural-commodity supply chains and restoring degraded forest lands.[67] By October 2017, there were some one hundred and ninety-one endorsers, including forty national governments and fifty-seven multinational companies such as Unilever, Nestle, Kellogg, Mars, and Cargill.[68]

Special attention was paid to key industries and firms affecting global forest cover, such as palm oil, cattle ranching production, and soybeans in countries like Indonesia and Brazil. Efforts were targeted at getting companies like Wilmar, responsible for 45 percent of the palm-oil trade, to establish policies that would restrict the purchase of palm oil from deforested lands, particularly from peat-rich areas. Other efforts focused on the consumption side, with campaigns seeking to urge the Girl Scouts of America to commit to sustainably sourced palm oil in their cookies.[69]

Since then, strategies to reduce greenhouse gas emissions from forest, food, and land-use sectors have struggled. In 2017, the world lost some 39 million acres of tropical forest, an area the size of Bangladesh, topping the previous record set in 2016.[70]

These setbacks took place in the wake of some earlier success. In the mid-2000s, Brazil successfully curbed deforestation when its economy was booming. Strong regulations, enforcement, and voluntary moratoriums on deforestation in the beef and soy sectors turned

62 REDD+ stands for Reduced Emissions from Deforestation and Degradation. The plus reflects an expanded agenda to include conservation of forest carbon stocks, sustainable forests management, and enhancement of forest carbon stocks.

63 Frances Seymour, "Meet the Experts: Q&A with Frances Seymour," *World Resources Institute* (blog), October 2, 2017, http://www.wri.org/blog/2017/08/meet-experts-qa-frances-seymour.

64 Forest Carbon Partnership Facility, "About FCPF," 2018, https://www.forestcarbonpartnership.org/about-fcpf-0.

65 The Consumer Goods Forum, "Implementing and Scaling up the CGF Zero Net Deforestation Commitment," April 12, 2017, https://www.theconsumergoodsforum.com/implementing-and-scaling-up-the-cgf-zero-net-deforestation-commitment/.

66 Global Forest Watch, "About," https://www.globalforestwatch.org/about.

67 Michael Wolosin, *Quantifying the Benefits of the New York Declaration on Forests* (Washington, DC: Climate Advisers, September 2014), https://www.climateadvisers.com/nydf/.

68 New York Declaration on Forests, "Endorsers—NYDF Global Platform," Undated, https://nydfglobalplatform.org/endorsers/.

69 Climate Advisers, "Forests + Lands," 2018, https://www.climateadvisers.com/content/forests-lands/.

70 Brad Plumer, "Tropical Forests Suffered Near-Record Tree Losses in 2017," *New York Times*, June 27, 2018, https://www.nytimes.com/2018/06/27/climate/tropical-trees-deforestation.html.

Brazil into a success story, as emissions from forests declined by 84 percent between 2004 and 2011.[71] However, the economic and corruption problems that have plagued the country in recent years hollowed out resources and political support needed to contain the problem. Regulations were loosened, enforcement declined, and agribusiness interests hostile to forest conservation have gained political power. Compensation mechanisms offered by the government of Norway have not proven to be large enough to change local actors' incentives in Brazil.[72]

Similar problems of weak state capacity, lack of political will, corruption, and insufficient incentives have plagued Indonesia, another forest-rich country, despite the promise of $1 billion from Norway (of which only some 12 percent had been disbursed as of March 2018).[73] Industries like palm oil are still far more attractive than conservation. However, Indonesia has taken some action, as a moratorium on converting peatland to agricultural land took effect in 2016. This was particularly important because carbon- and methane-rich peatlands have been the sites of many of the forest fires that choked the region in recent years.[74]

Colombia is another country of concern. It has been more peaceful since the demobilization of the Revolutionary Armed Forces of Colombia (FARC) rebel army, but one negative side effect is that forests have become more accessible, leaving an opening for palm oil and other sources of deforestation to emerge.[75]

Together, these observations suggest this is an important moment to take stock of what needs to be done going forward to maximize the potential of natural climate solutions.

Forests, land use, and climate-smart agriculture play prominent roles in assessments of mitigation potential. All of the assessments for staying below the 1.5-degree threshold rely on carbon removal, principally achieved through land-use practices. One 2017 study by the Nature Conservancy estimated that cost-effective natural solutions to climate mitigation could avoid 11.3 billion tons of carbon dioxide equivalent, equal to stopping all oil burning. That would provide about 37 percent of the emissions reductions needed by 2030 to keep temperatures below the 2-degrees target.[76]

It is important to note that in this area of "natural solutions," a distinction needs to be made between mature technologies and relatively untested ones. Several technologies, such as reforestation/afforestation, improved forest management, and soil organic carbon sequestration are mature, and can be successful at scale. Others are still at the demonstration stage, such as biochar (a method to convert biomass to decomposition-resistant charcoal) and bioenergy and carbon capture (burning biomass and capturing/sequestering emissions).[77]

Scientists and policymakers are increasingly looking for ways to remove or sequester carbon from the atmosphere—not just reduce the amount of greenhouse gases emitted by human activity. Temperature increases will be a function of the concentration of global-warming agents in the atmosphere. In a bathtub, if one opens the drain to let water out, one can add more water from the faucet without the bathtub spilling over. One method of removing additional carbon is the possibility of negative emissions from land-use practices, often referred to as bioenergy with carbon capture and storage (BECCS).[78] The idea behind BECCS is to use the Earth as a giant sponge that absorbs carbon on a planetary scale.

71 Philip Fearnside, "Business as Usual: A Resurgence of Deforestation in the Brazilian Amazon," *Yale Environment 360,* April 18, 2017, https://e360.yale.edu/features/business-as-usual-a-resurgence-of-deforestation-in-the-brazilian-amazon.

72 Hiroko Tabuchi, Claire Rigby, and Jeremy White, "Amazon Deforestation, Once Tamed, Comes Roaring Back," *New York Times*, February 24, 2017, https://www.nytimes.com/2017/02/24/business/energy-environment/deforestation-brazil-bolivia-south-america.html.

73 Nithin Coca, "Despite Government Pledges, Ravaging of Indonesia's Forests Continues," *Yale Environment 360*, March 22, 2018, https://e360.yale.edu/features/despite-government-pledges-ravaging-of-indonesias-forests-continues.

74 Plumer, "Tropical Forests Suffered Near-Record Tree Losses in 2017"; Chris Land, "After Seven Years, Norway's US$1 Billion REDD Deal in Indonesia Is Still Not Stopping Deforestation," *REDD-Monitor* (blog), December 28, 2017, http://www.redd-monitor.org/2017/12/28/after-seven-years-norways-us1-billion-redd-deal-in-indonesia-is-still-not-stopping-deforestation/.

75 Taran Volckhausen, "As Colombia Expands Its Palm Oil Sector, Scientists Worry about Wildlife," *Mongabay*, June 21, 2018, https://news.mongabay.com/2018/06/as-colombia-expands-its-palm-oil-sector-scientists-worry-about-wildlife/.

76 The Nature Conservancy, "Nature's Make or Break Potential for Climate Change," 2018, https://global.nature.org/initiatives/natural-climate-solutions/natures-make-or-break-potential-for-climate-change; Bronson W. Griscom et al., "Natural Climate Solutions," *Proceedings of the National Academy of Sciences* vol. 114, no. 44, 2017, pp. 11645–11650, https://doi.org/10.1073/pnas.1710465114.

77 Maria Belenky, Peter Graham, and Claire Langley, *Creating Negative Emissions: The Role of Natural and Technological Carbon Dioxide Removal Strategies* (Washington, DC: Climate Advisers, 2018), https://www.climateadvisers.com/creating-negative-emissions-the-role-of-natural-and-technological-carbon-dioxide-removal-strategies/.

78 BECCS strategies involve using crops and tree biomass to capture carbon, using biomass for industrial applications and then injecting greenhouse gas emissions into geological foundations, using charcoal as a soil amendment (biochar), biomass burial, enhanced weathering, and other measures.

Natural climate solutions including forest conservation could meet 30 percent of climate solutions needed between now and 2030. *Photo credit:* Unsplash/Dhruva Reddy

Importantly, while plants have been removing carbon from the atmosphere for millions of years, human-engineered BECCS remain an unproven strategy at scale. It is likely to carry significant risks and costs. Using a sizable portion of arable land for bioenergy, for example, would take away land that might be needed to feed a growing global pollution. This could reduce food security and increase food prices. Questions remain, therefore, about the desirability and feasibility of relying heavily on BECCS.

This has led inventors and investors to explore technological means for removing carbon directly from the atmosphere. Approximately a dozen companies in the United States alone are developing techniques for capturing carbon directly from the air and storing it in useful (potentially profitable) forms, such as concrete that could be sold for buildings and infrastructure. It's too early to say whether these new ideas will prove practical and cost-effective in time to help meet global temperature goals. Direct air-capture technologies tested in laboratories require enormous amounts of energy, which might severely limit their effectiveness and affordability. For now, it's best to think of negative-emissions technologies as essential to pursue, but not yet feasible enough to bet the planet on them.

In the forest and land-use space, policymakers could encourage greater emissions mitigation using today's technologies. When it comes to forest-management policies that can sequester carbon, there is an example of success at scale, albeit fleeting, in the case of Brazil. Between 2004 and 2013, avoided emissions from deforestation in Brazil amounted to 3.2 billion tons of carbon dioxide, more than three times the equivalent of taking all US cars off the road.[79]

Moreover, when evaluating whether REDD+ programs have worked, it must be acknowledged that the volume of money directed toward the land-use sector has

79 Brian Clark Howard, "Brazil Leads World in Reducing Carbon Emissions by Slashing Deforestation," *National Geographic*, June 5, 2014, https://news.nationalgeographic.com/news/2014/06/140605-brazil-deforestation-carbon-emissions-environment/.

been small, less than 2 percent of mitigation-related climate finance.[80] What that means, in the words of the renowned forest analyst Frances Seymour, is that "REDD+ remains a great idea that's hardly been tried."[81]

Ongoing assessments of the New York Declaration on Forests suggest unfulfilled potential. While many private-sector companies now have deforestation commitments, progress has been limited—due, in part, to vagueness of commitments and opacity of firm activity. Moreover, the amount of funding needed to change the incentive structure of private actors to support conservation seems wholly inadequate.[82]

To that end, scholars at the Center for Global Development have proposed a Tropical Forest Finance Facility, which would pay countries for performance in meeting forest-conservation goals. They envision a facility endowed with $100 billion from investor countries, philanthropies, and private investors, and which would generate $5 billion annually in returns to be used to support payments for forest conservation.[83] Current global political conditions may not favor that kind of out-of-the-box solution, even if it would be highly cost-effective.

Financial incentives, however, are only part of the reason efforts to date have struggled. In a July 2018 study, Norway, which spent $3 billion over the last decade to try to arrest deforestation, drew important lessons from its experience, concluding that there should be enhanced restrictions on the use of biofuels made from imported palm oil and soy, particularly by the European Union. The report concluded that subsidy reform ought to be a critical part of engagement strategies with host countries, to discourage wanton destruction of forests. Other important strategies include more robust land rights for indigenous groups and new resources for forest recovery. Perhaps most important is that Norway needs partners—other states and private-sector actors—to change the incentive structures so that countries gain more from forest protection and land-use policies that avoid emissions.[84]

The agenda is not just about forests, but also agriculture and land-use policies. Much food is wasted and/or produced inefficiently, leading to pressures for extensive, rather than intensive, land use. In 2018, in the lead-up to the Global Climate Action Summit, the government of California and dozens of leading NGOs launched the "30X30 Forests, Food and Land Challenge." The idea is that 30 percent of the climate solutions by 2030 can, and should, come from actions related to forests, food, and land.[85] Some of the goals include reducing food waste, sequestering more forest carbon, encouraging better methods of food and fiber production, enhanced transparency mechanisms, public-private partnerships, and protecting local rights.[86]

The challenge remains creating sufficient political will to really do what's needed for natural climate solutions to become a driving force in climate action. Despite the long history of this issue, one has the sense of being still at the beginning, with public education, advocacy, and consumer preferences key to driving progress in both developed and developing countries.

Building a Carbon Neutrality Alliance

The science is clear: any global strategy that seeks to prevent global temperatures from rising to dangerous levels necessarily implies decarbonization by 2050, or soon thereafter.

At the One Planet Summit, organized by French President Emmanuel Macron in December 2017, a key goal was the zero-net-emissions target. Led by New Zealand and the Marshall Islands, some sixteen countries—most prominently France and Sweden—have joined a "Towards Carbon Neutrality" coalition with similar midcentury

80 Michele de Nevers, Kenneth Lay, Michael Wolosin, and Patricia Bliss-Guest, *Creating a Multilateral Wealth Fund for a Global Public Good: A Proposal for a Tropical Forest Finance Facility*, (Washington, DC: Center for Global Development, 2018), p. 4, https://www.cgdev.org/publication/creating-multilateral-wealth-fund-global-public-good-proposal-tropical-forest-finance.

81 Seymour, "Meet the Experts: Q&A with Frances Seymour"; Frances Seymour and Jonah Busch, *Why Forests? Why Now?: The Science, Economics, and Politics of Tropical Forests and Climate Change* (Washington, DC: Center for Global Development, 2016).

82 New York Declaration on Forests Progress Assessment, "Shifting Finance to Protect Forests: 2017 Progress Assessment of the New York Declaration on Forests," 2018, http://forestdeclaration.org/.

83 Michele de Nevers, *A Global Offer to Reduce Deforestation: $5 Billion a Year for 20 Years*, (Washington, DC: Center for Global Development, 2018), https://www.cgdev.org/blog/global-offer-reduce-deforestation-5-billion-year-20-years.

84 Mike Gaworecki, "'Saving the Rainforest 2.0:' New Report Makes Recommendations for Improving Forest Protection," *Mongabay*, July 2, 2018, https://news.mongabay.com/2018/07/saving-the-rainforest-2-0-new-report-makes-recommendations-for-improving-forest-protection/.

85 World Wildlife Fund, press release, "Forests, Food and Land Can Deliver 30% of Solutions Needed to Tackle Climate Crisis by 2030," June 11, 2018, http://wwf.panda.org/wwf_news/press_releases/?329190/Forests-food-and-land-can-deliver-30-of-solutions-needed-to-tackle-climate-crisis-by-2030.

86 World Wildlife Fund, "Land: The Overlooked Part of the Climate Solution," 2018, https://climatelandchallenge.org/.

Cost competitive renewables technologies are helping displace coal and are making a clean energy transition possible. *Photo credit:* Unsplash/Karsten Würth

goals.[87] Another member of the coalition, Costa Rica, is already carbon neutral thanks to its growing forests and abundant hydropower. Sweden has similar natural resources—but with a more industrialized economy—and has set a goal of carbon neutrality by 2045.

Given that most of these countries are responsible for a relatively small proportion of greenhouse gas emissions, the mantle of climate leadership moved to this disparate group and away from the major powers in 2015, when China and the United States led efforts to forge the Paris Agreement. Though these new climate leaders face long odds, the quest for decarbonization needs to start somewhere.[88]

For those long-term goals to be meaningful, the target has to be disaggregated and applied in all the major sectors responsible for greenhouse gas emissions. More nations are pledging to develop deep decarbonization plans. For example, the European Climate Foundation (ECF) has organized the Net-Zero 2050 initiative to identify mid-century pathways to decarbonization. ECF and its partners have launched the 2050 Roadmap Tool, an economy-wide calculator to help countries identify pathways to net-zero emissions by 2050.[89]

Though carbon neutrality cannot be addressed solely through one sector, perhaps none is more important than the electricity sector, which is responsible for about a quarter of global greenhouse gas emissions.

When it comes to power-sector decarbonization, a number of countries have announced their intent to phase out coal entirely as a source of electricity. Launched in late 2017, the "Powering Past Coal Alliance," which includes Canada, the UK, and some twenty other countries, announced a post-coal agenda.[90] The question is how to translate that ambition into reality.

87 Government of France, "One Planet Summit—The 12 #OnePlanet Commitments," December 12, 2017, https://www.oneplanetsummit.fr/en/the-12-oneplanet-commitments/.

88 Joshua W. Busby, "3 Things We Learned at This Week's U.N. Climate Change Meeting," *Washington Post*, November 17, 2017, https://www.washingtonpost.com/news/monkey-cage/wp/2017/11/17/what-did-we-just-learn-at-the-u-n-climate-change-meeting/.

89 European Climate Foundation, *Net-zero 2050*, June 2018, https://europeanclimate.org/net-zero-2050/.

90 United Nations Framework Convention on Climate Change, "More than 20 Countries Launch Global Alliance to Phase Out Coal," November 17, 2017, https://unfccc.int/news/more-than-20-countries-launch-global-alliance-to-phase-out-coal.

Though coal is still responsible for about 40 percent of electricity worldwide, the scale-up in power from renewable energy technologies in recent years has been dramatic. China's aggressive support for the solar sector has reduced solar cell prices, and both wind and solar are now competitive with conventional fossil fuels in many parts of the world. New capacity additions favor both renewables and natural gas over coal. The displacement of coal in the provision of electricity has created new optimism about the scope for clean electrification of other sectors, namely transportation.

A 2018 Bloomberg New Energy Finance report projects that, by 2050, renewables could be responsible for nearly 50 percent of total global electricity supply, providing more than 87 percent of electricity in Europe, 75 percent in India, 62 percent in China, and 55 percent in the United States.[91]

However, celebration of renewables' increased potential to usher in a clean energy transition is premature. Even as market dynamics have encouraged the private sector to add renewables capacity, those projections still hinge on public policies that address issues of access to finance and grid integration.

Despite dramatic growth in recent years, non-hydro renewables, including solar and wind, are still responsible for a small share of electricity (8.4 percent in 2017). That is a 6.1-percentage-point increase from 2007, but renewables are not merely displacing coal (which declined by 3.1 percent over the same time period) but also nuclear (which declined by 3.4 percent), another near-carbon-free source of electricity.[92]

However, while renewable generation capacity may be rising, the displacement of coal by renewables in electricity is by no means assured. Take India, for example. In 2014, the government established a dramatic target to increase solar to 100 gigawatts (GW) of installed capacity by 2022, up from 2.5 GW. By late 2017, about 20 GW had been installed, meaning that coal still provided about three quarters of India's electricity. Latest estimates suggest that, at best, India will have about 55 GW of installed solar by 2022—orders of magnitude more than 2014, but short of the stretch goal of 100 GW. India faces a number of barriers, not least of which is the difficult financial legacy of the country's power-distribution companies.[93]

While many of the obstacles India faces are internal ones, countries seeking to displace coal with renewables face common challenges, including battery storage for intermittent energy sources. While private-sector actors such as Tesla have made tremendous progress in this space, more collaborative work could be done to help advance the technology and drive down the costs of battery storage.[94] This could mean technology partnerships like the bilateral US-India and US-China clean energy research centers/partnerships or broader initiatives like Mission Innovation, the multinational public-private process that emerged from the 2015 Paris Agreement.

Prohibitively high borrowing costs are another problem facing many developing countries that want to pursue solar and wind. For this reason, Kanika Chawla and Arunabha Ghosh of the India-based Council on Energy, Environment and Water (CEEW) have proposed that the International Solar Alliance develop a new financial instrument that would pool risk and unlock billions in low-cost, private-sector capital.[95]

A third area where international cooperation is needed is to head off trade friction over renewables. In January 2018, the Trump administration imposed 30-percent duties on imported solar panels.[96] Also, in July 2018, India imposed 25-percent tariffs on imported panels from China and Malaysia.[97] Allowing the renewables economy to get swept up in wider trade disputes is likely to dampen enthusiasm and slow the pace of change.

One estimate suggested the tariffs would lead to an 11-percent reduction in additions of US solar capacity

91 "New Energy Outlook 2018," *Bloomberg NEF*, 2018, https://about.bnef.com/new-energy-outlook/.

92 Compare that to coal at 38 percent and natural gas at 23 percent. BP, "Statistical Review of World Energy," June 2018, https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html.

93 Busby and Shidore, "Still Shining?"

94 Arunabha Ghosh, "Why Climate Action Needs Solution-Oriented Partnerships," speech delivered at the University of Texas-Austin, May 27, 2015, http://www.stanleyfoundation.org/climatechange/GhoshKeynoteAddress.pdf.

95 Kanika Chawla and Arunabha Ghosh, "The Sun Shines Brighter If the Risks Don't Cloud It," *PV Magazine International*, March 20, 2018, https://www.pv-magazine.com/2018/03/20/the-sun-shines-brighter-if-the-risks-dont-cloud-it/.

96 Timothy Cama, "Trump Imposes 30 Percent Tariff on Solar Panel Imports," *The Hill*, January 22, 2018, http://thehill.com/policy/energy-environment/370171-trump-imposes-30-tariffs-on-solar-panel-imports.

97 Anindya Upadhyay, "India Proposes Safeguard Duty on China, Malaysia Solar Cells," *Bloomberg*, July 17, 2018, https://www.bloomberg.com/news/articles/2018-07-17/india-slaps-25-safeguard-duty-on-chinese-malaysian-solar-cells.

between 2018 and 2022.[98] More worrisome, renewables investments globally actually declined in 2017, to $298 billion from $318 billion the year before.[99] For the clean energy transition to move forward, it is imperative that renewables be shielded from wider trade disputes, or be addressed as part of a broader compromise.

> "Electric vehicles and renewables now make it possible to envision the end of the internal-combustion engine—the question is no longer whether, but when."

Launching an Electric Vehicles Compact

Electric vehicles and renewables now make it possible to envision the end of the internal-combustion engine—the question is no longer whether, but when. Countries such as the Netherlands, Norway, and the UK have announced ambitious goals to have all new cars be battery powered in the coming years. Even China has considered such an idea.[100]

There is real enthusiasm emerging for electric vehicles (EVs). A 2018 Bloomberg New Energy Finance study projected robust penetration of electric vehicles, with half of new cars and one third of the world's vehicle fleet—some 559 million vehicles—being electric by 2040.[101]

As part of its Made in China campaign to boost manufacture of next-generation high technology for both domestic consumption and export, China is leading the way, with nearly five hundred different electric vehicle manufacturers.[102] Six Chinese cities—Beijing, Tianjin, Shanghai, Hangzhou, Guangzhou, and Shenzen—have established major restrictions on new sales of internal-combustion engines. These cities made up 40 percent of electric vehicle sales in China in 2017.[103]

However, those projections depend crucially on states and private actors overcoming several obstacles in resource rivalry, trade competition, technology, and infrastructure. For example, a number of key minerals—such as lithium, cobalt, and nickel—are used in electric vehicle batteries, and increased geopolitical and trade tension could lead to scrambles for resources and technology, rather than collaborative efforts to innovate and minimize the need for as many raw materials.

An electric vehicle partnership, combined with renewables, would help identify common challenges, and could provide an avenue for joint work as envisioned by Mission Innovation. A battery partnership for storage could also be useful for the transport sector.[104] Collaborative efforts could also be made to encourage both mineral recycling and technological innovation to reduce the mineral content needed in batteries.

The Zero Emission Vehicle (ZEV) Challenge—championed by the Climate Group along with the state of California and global cities including New York City, London, and Paris—suggests a means of bringing together public- and private-sector leaders for pledges to scale up the electric vehicle fleet and investment in appropriate charging infrastructure. Similar targets are also envisioned for procurement of public and business fleets. The aim is also to encourage automakers to set targets for phasing out the internal-combustion engine, and for achieving a certain percentage of ZEVs among automobile sales.[105]

Some companies may be willing to step forward. The UK's announcement that it would ban new sales of internal-combustion engines by 2040 prompted Shell's CEO to encourage the country to move up the

98 Jim Puzzanghera and Don Lee, "The Roiled Solar Power Market Shows How Trump's Tariffs Can Disrupt an Industry," *Los Angeles Times*, July 7, 2018, http://www.latimes.com/business/la-fi-solar-tariffs-20180707-story.html.

99 Anjli Raval, Leslie Hook, and David Sheppard, "Fall in Renewable Energy Investment Threatens Climate Goals," *Financial Times*, July 17, 2018, https://www.ft.com/content/20af1fea-898a-11e8-bf9e-8771d5404543. For similar findings, see International Energy Agency, "World Energy Investment 2018," July 17, 2018, http://www.iea.org/wei2018/.

100 Danielle Muoio, "These Countries Are Banning Gas-Powered Vehicles by 2040," *Business Insider*, October 23, 2017, http://www.businessinsider.com/countries-banning-gas-cars-2017-10.

101 "Gas Guzzlers Set to Fade as China Sparks Surge for Electric Cars," *Bloomberg*, May 21, 2018, https://www.bloomberg.com/news/articles/2018-05-21/gas-guzzlers-set-to-fade-as-china-sparks-surge-for-electric-cars.

102 Trefor Moss, "China Has 487 Electric-Car Makers, and Local Governments Are Clamoring for More," *Wall Street Journal*, July 19, 2018, https://www.wsj.com/articles/china-has-487-electric-car-makers-and-local-governments-are-clamoring-for-more-1531992601.

103 "These Six Chinese Cities Dominate Global Electric-Vehicle Sales," *Bloomberg*, May 22, 2018, https://www.bloomberg.com/news/articles/2018-05-22/these-six-chinese-cities-dominate-global-electric-vehicle-sales.

104 Krishnan and Busby, "Key Regional Actors and Sector Opportunities for International Climate Change Cooperation."

105 The Climate Group, "The Zero Emission Vehicle (ZEV) Challenge," https://www.theclimategroup.org/project/zev-challenge.

deadline.[106] In June 2018, BP purchased the UK's biggest charging network for $170 million. That said, the Climate Group's private-sector group of electric vehicle (EV) backers, EV100, does not yet include major automobile makers or traditional fossil-fuel companies.[107]

China, for its part, is aggressively pursuing electric vehicles, as a way of furthering its industrial strategy and export competitiveness. China has learned from California's policies by mandating that automakers sell EVs or buy from competitors, with credits offered to electric vehicle makers based on the range and efficiency of the vehicles. By 2025, nearly 20 percent of passenger vehicles in China are projected to be electric.[108]

A state-led effort by high-ambition frontrunner countries would complement the ZEV Challenge. An important component would be recruiting and putting pressure on car makers to increase their ambition for electric vehicles, and to align public and private infrastructure investment to create incentives for them to embrace the technology. US carmakers will be an interesting test audience. With low gas prices in recent years, US automakers have experienced robust truck and SUV sales, and companies pressured the Trump administration to weaken Obama-era fuel-efficiency standards. The rollbacks ended up being more dramatic than the companies bargained for, prompting litigation from California, sixteen other states, and the District of Columbia—and potentially opening the door to more policy uncertainty.[109] Despite these moves, a number of large automakers, like General Motors, have tested the waters with electric vehicles. It remains to be seen if they embrace EVs more fully.

A combination of voluntary initiatives, regulation, subsidies, and ambitious mid-century decarbonization goals from frontrunner countries will help move the EV agenda along in the coming years, even if the Trump administration fails to embrace it.

Developing an Air Pollution Initiative

At the height of China's air pollution crisis in 2013, scientists estimate that air pollution in northern China was reducing life expectancy by more than five years.[110] In India, air quality in cities like New Delhi is so bad that scientists liken it to smoking forty-five cigarettes a day.[111]

Climate advocates have frequently talked about the co-benefits climate action could provide for other problems, like air pollution, but these arguments have the logic inverted. In countries like China and India, air pollution provides a more politically salient immediate driver of policy change than does climate change. So, actions to address air pollution, if done correctly, can generate co-benefits for climate change. This is especially true if countries deal with the air pollution challenge by switching fuel from coal to renewables. Other policies, such as converting coal to liquids or moving coal-burning factors to less polluted areas, are less useful from a climate co-benefits perspective.[112]

Since China's "airpocalypse" of incredible pollution emerged several years ago, the government has taken heroic measures to close down dirty industries, among other policies. This has yielded progress. Chinese cities cut fine particulates by more than 30 percent between 2014 and 2017, with life-expectancy gains of as much as 2.4 years if the improvements are sustained.[113] While policies could be framed and motivated in terms of addressing air pollution, climate policies that are intended to reduce greenhouse gases—such as emissions-trading schemes—will in fact produce major health gains. By one estimate, a 4-percent reduction in greenhouse gas emissions per year in China would yield more than $330 billion in health savings by 2030.[114]

106 Steve Hanley, "Shell CEO Calls for UK To Ban Gas/Diesel Car Sales Sooner," *CleanTechnica*, July 7, 2018, https://cleantechnica.com/2018/07/07/shell-ceo-calls-for-uk-to-ban-internal-combustion-engine-sales-sooner/.

107 The Climate Group, "EV100," https://www.theclimategroup.org/project/ev100.

108 Michael J. Coren, "China Is Going to Sell Half the World's Electric Cars by Borrowing Policies from California," *Quartz*, May 23, 2018, https://qz.com/1286376/china-is-going-to-sell-half-the-worlds-electric-cars-by-borrowing-policies-from-california/.

109 Robinson Meyer, "How the Carmakers Trumped Themselves," *Atlantic*, June 20, 2018, https://www.theatlantic.com/science/archive/2018/06/how-the-carmakers-trumped-themselves/562400/.

110 Charles Riley, "Air Pollution Cuts Life Expectancy by 5.5 Years in China—Study," *CNN*, July 9, 2013, https://money.cnn.com/2013/07/09/news/china-air-pollution/index.html.

111 Zoë Schlanger, "Breathing New Delhi's Air Right Now Is the Equivalent of Smoking 45 Cigarettes a Day," *Quartz*, November 8, 2017, https://qz.com/1124049/air-pollution-in-new-delhi-has-the-health-effect-of-smoking-45-cigarettes-a-day/.

112 Joshua Busby and Sarang Shidore, *How the United States Can Reinforce Chinese Action on Climate Change* (Chicago: Paulson Institute, 2015), http://www.paulsoninstitute.org/think-tank/2015/07/20/how-the-united-states-can-reinforce-chinese-action-on-climate-change/.

113 Michael Greenstone, "Four Years After Declaring War on Pollution, China Is Winning," *New York Times*, March 12, 2018, https://www.nytimes.com/2018/03/12/upshot/china-pollution-environment-longer-lives.html.

114 Jennifer Chu, "Study: Health Benefits Will Offset Cost of China's Climate Policy," *MIT News*, April 23, 2018, http://news.mit.edu/2018/study-health-benefits-will-offset-cost-china-climate-policy-0423.

Politicians have to breathe the same dirty air as their citizens, and they can expect more short-term electoral rewards for acting to improve air quality. High-ambition countries and cities that have historically experienced air quality problems but improved over time ought to partner with countries and cities still experiencing such problems. Officials from Mexico City, Los Angeles, and other metropolitan areas could help advise partners on their experiences, such as supporting fuel switching, investing in renewables and mass transit, shutting dirty industries, improving vehicle efficiency, limiting driving days, experimenting with congestion pricing, banning crop burning, and other measures.

Such twinning programs could help disseminate lessons learned. The World Bank and the Global Environment Facility could make this a signature priority and help finance such programs, particularly in lower middle-income countries such as India, so long as they were designed to encourage the creation of climate co-benefits. This could be a significant amount of money, which could crowd in private-sector investment. The World Bank estimated that more than $20.5 billion (more than 32 percent) of its lending portfolio in 2018 produced climate co-benefits.[115]

In China's case, it is rich enough and will profit enough from such programs to afford them on its own. Internationalizing the problem could have other benefits, as some of the pollution from China reaches Japan, Korea, and as far as California.

Encouraging Chinese Climate Ambition at Home and Abroad

China's emissions and actions at home and abroad will be central to the adequacy of climate actions. Transparency and reporting mechanisms will be critical to the ability for other states and nonstate actors to evaluate China's progress.

In the short run, that means robust efforts to ensure a successful outcome for the Paris Agreement rules at global climate negotiations in Poland, where China has signaled it is prepared to accept standards similar to Europe's. At this point, it remains to be seen whether the negotiations in Poland will yield a breakthrough on transparency that establishes rigorous standards for all leading economies. Whatever emerges from that process will likely be a first step, as the international arena lacks strong enforcement mechanisms. Perhaps as important, if not more so, is whether leading countries face international and domestic pressure to be more transparent and forthcoming in their accounting and reporting mechanisms.

> "Politicians have to breathe the same dirty air as their citizens, and they can expect more short-term electoral rewards for acting to improve air quality."

The July 2018 EU-China joint statement seems to be a step in the right direction.[116] Beyond this moment, other leading high-ambition nations, particularly low-lying island nations in the Pacific, will have the moral authority to encourage China to lead at home and abroad, through vigorous efforts to peak emissions by 2030 or sooner, to scale up renewables and EVs, and to ensure China's overseas finance is climate compatible.

As for overseas finance, Jennifer Morgan of Greenpeace encourages the AIIB to adopt a coal- and oil-free policy, including through intermediaries. She also notes that the major sources of funds for the Belt and Road Initiative—the China Development Bank and Export-Import Bank of China—do not have transparent sustainability or accountability standards, but should. It is unclear that simply asking these actors to adopt such standards will lead to changes.

Track-two dialogues, like the July 2018 China-US High-Level Dialogue held in San Francisco before the September Global Climate Action Summit, provide forums for these issues to be raised.[117] Again, low-lying island nations facing existential threats from climate change ought to be involved in public settings, as these moments create maximum pressure for China to respond positively to the needs of its neighbors.

115 World Bank, press release, "World Bank Group Exceeds Its Climate Finance Target with Record Year," July 19, 2018, http://www.worldbank.org/en/news/press-release/2018/07/19/world-bank-group-exceeds-its-climate-finance-target-with-record-year.

116 Hill, "EU & China Sign Joint Statement Increasing Cooperation on Climate Change & Clean Energy."

117 "U.S., Chinese Scholars Say Cooperation Is Key to Combatting Climate Change," *Xinhua*, July 18, 2018, http://www.xinhuanet.com/english/2018-07/18/c_137333264.htm.

CONCLUSION

Efforts to address climate change face some turbulence in the immediate future, not least because of the Trump administration's rejection of a US leadership role. That said, the administration's effects on US emissions and global policy may prove more transitory than many feared. In response to the absence of US federal leadership, frontrunner countries and actors with high ambition to address climate change need to identify a handful of high-impact areas where progress can be made.

This report is an opening salvo in a broader conversation that requires creative and interdisciplinary thinking to accelerate action in the areas identified by the various assessments of where to harvest progress. This priority list reflects initial intuitions about which areas hold the most promise diplomatically and would yield the biggest climate and development benefits.

APPENDIX A: PRIORITY AREAS FOR EMISSIONS MITIGATION

America's Pledge Opportunity Agenda 2018[1]	Kuramochi 2018 et al.[2]	Vogt-Schlib and Hallegatte 2017[3]
1. Strengthen renewable-energy targets. 2. Accelerate coal-plant retirements. 3. Retrofit buildings at key points. 4. Electrify building energy use. 5. Accelerate electric vehicle adoption. 6. Phase out super-polluting hydrofluorocarbons (HFCs). 7. Prevent methane leaks at the wellhead. 8. Reduce methane leaks in cities. 9. Reduce land-sector carbon emissions and increase terrestrial sequestration. 10. Establish and expand state and regional carbon markets.	1. Sustain the growth rate of renewables and other zero- and low-carbon power generation until 2025, to reach 100-percent share by 2050. 2. Power: No new coal plants; reduce emissions from existing coal fleet 30 percent by 2025. 3 Passenger transport: Last fossil-fuel passenger car sold by 2035–2050. 4. Aviation and shipping: Develop and agree on a 1.5-degree-Celsius-consistent vision. 5. Buildings: All new buildings fossil-free and near zero energy by 2020. 6. Buildings: Increase renovation rates from less than 1 percent in 2015 to 5 percent by 2020. 7. Industry: All new installations in emissions-intensive sectors low-carbon after 2020; maximize material efficiency. 8. Forestry: Reduce emissions from forestry and other land use to 95 percent below 2010 levels by 2030; stop net deforestation by 2025. 9. Agriculture: Keep emissions in 2020 at or below current levels, establish and disseminate regional best practice, ramp up research. 10. CO2 removal: Accelerate research and planning for negative emission technology deployment.	1. Decarbonizing the production of electricity (e.g., using renewable power). 2. Undertaking massive electrification (e.g., using electric vehicles and electric boilers), and where not possible, switching to cleaner fuels (e.g., biofuels). 3. Switching to less carbon-intensive materials (e.g., wood instead of cement) and diets (e.g., away from beef). 4. Improving efficiency and reducing waste in all sectors. 5. Preserving and increasing natural carbon sinks, through improved management of forests and other vegetation and soils.

1 America's Pledge, press release, "America's Pledge Outlines Bottom-Up Opportunity Agenda for U.S. State, City and Business Action on Climate," July 17, 2018, https://www.americaspledgeonclimate.com/news/americas-pledge-outlines-bottom-opportunity-agenda/.

2 Takeshi Kuramochi, Niklas Höhne, Michiel Schaeffer, Jasmin Cantzler, Bill Hare, Yvonne Deng, Sebastian Sterl, Markus Hagemann, Marcia Rocha, Paola Andrea Yanguas-Parra, Goher-Ur-Rehman Mir, Lindee Wong, Tarik El-Laboudy, Karlien Wouters, Delphine Deryng, and Kornelis Blok., "Ten Key Short-Term Sectoral Benchmarks to Limit Warming to 1.5°C," Climate Policy vol. 18, no. 3, March 2018, pp. 287–305, https://doi.org/10.1080/14693062.2017.1397495.

3 Adrien Vogt-Schilb and Stephane Hallegatte, Climate Policies and Nationally Determined Contributions: Reconciling the Needed Ambition with the Political Economy (Washington, DC: Inter-American Development Bank, 2017), https://doi.org/10.18235/0000714.

Drawdown 2017 (ranked by emissions reductions)[4]	Hewlett Foundation 2017[5]	ClimateWorks 2017[6]
1. Refrigerant management. 2. Wind turbines (onshore). 3. Reduced food waste. 4. Plant-rich diet. 5. Tropical forests. 6. Educating girls. 7. Family planning. 8. Solar farms. 9. Silvopasture 10. Rooftop solar.	1. Reduce fossil fuels: We must continue to support current efforts to peak global use of fossil fuels as early as possible. 2. Work on energy systems: We must pivot from narrowly focusing on specific sub-elements of the energy sector to looking for systemic shifts that are potentially transformational. 3. Integrate across sectors: For example, transforming the transportation sector will require going beyond vehicle improvement and integrating it with the electricity, information, and land-use sectors. 4. Store carbon in the land: Climate models suggest that nearly a third of global emissions reductions must come from managing our lands, agriculture, and forests. 5. Promote innovation: Climate philanthropy needs to invest more in research, analysis, and advocacy for policies that drive innovation in advanced energy systems and technologies.	1. Pursue global tipping points: For many strategies, we need to determine the best ways to create global markets that can spread climate-friendly technologies and business models around the world. 2. Go all out for clean electricity: We must simultaneously decarbonize most power generation and convert energy end uses to electricity wherever possible. 3. Scale carbon-dioxide removal: We will need carbon-dioxide removal on a large scale starting shortly after 2050. 4. Focus on forests, lands, and food: Success requires that we do a much better job of protecting, managing, and restoring lands—both forested and agricultural—while, at the same time, addressing demand-side drivers such as food waste and global growth in beef consumption. 5. Explore strategies to tackle basic drivers: We need to further explore opportunities to influence powerful climate drivers outside of energy and land use, such as population increase and consumer behavior.

4 Paul Hawken (editor), Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming (New York: Penguin Books, 2017), https://www.drawdown.org/.
5 Hewlett Foundation, "Climate Initiative Strategy 2018-2023," November 2017, https://s27477.pcdn.co/wp-content/uploads/2018/01/Hewlett-Foundation-Climate-Initiative-Strategy-2018-2023.pdf.
6 ClimateWorks Foundation, "2050: Philanthropic Priorities for Climate Action," December 2017, https://www.climateworks.org/blog/2050-philanthropic-priorities-climate-action/.

ABOUT THE AUTHORS

Joshua Busby is an associate professor at the LBJ School of Public Affairs at the University of Texas-Austin. He is a distinguished scholar at the Strauss Center for International Security and Law and a non-resident fellow with the Chicago Council on Global Affairs. In 2018-2019, he is also a policy engagement fellow with the Bridging the Gap project. Dr. Busby has published widely on transnational advocacy movements, climate change, global health, and other topics for various think tanks and academic journals including the Council on Foreign Relations, the Brookings Institution, the Center for a New American Security, among others. He has been a leading investigator in two large research grants from the US Department of Defense on climate change and national security. His first book, *Moral Movements and Foreign Policy*, was published by Cambridge University Press in 2010. His second book *AIDS Drugs for All: Social Movements and Market Transformations* with Ethan Kapstein was published by Cambridge University Press in 2013 and won the 2014 Don K. Price Award (for the best book on science, technology, and environmental politics).

Nigel Purvis is the founding President and CEO of Climate Advisers, a Washington, DC-based consultancy specializing in US climate change policy, international climate change cooperation, global carbon markets, and climate-related forest conservation. The firm's clients include philanthropic foundations, think tanks, environmental groups, governments, international organizations, companies and financial institutions. Nigel directed US environmental diplomacy as Deputy Assistant Secretary of State for Oceans, Environment, and Science. In that capacity he shaped US foreign policy relating to climate change, biodiversity conservation, forests, toxic substances, ozone depletion and environmental aspects of international trade. He worked closely with senior officials in the White House, Congress and key federal agencies, and negotiated internationally with ministers and ambassadors from around the world. Nigel joined the US climate negotiating team in 1998, working directly for US chief negotiators Frank Loy and Stuart Eizenstat. In 2001, he became the deputy chief US climate negotiator. From 2005 to 2007, Nigel served as the global vice president for policy and external affairs at The Nature Conservancy. From 2002 to 2005, he was a senior scholar in the foreign policy program of The Brookings Institution and an international affairs fellow at the Council on Foreign Relations. His books, essays, articles and interviews on climate change, environmental diplomacy, economic development, international assistance and foreign affairs have appeared in leading book stores, news outlets and academic journals around the world. His most recent edited volume, *Climate Change and Global Poverty*, was selected by critics as a Best Book of 2010.

Atlantic Council Board of Directors

The Atlantic Council is a nonpartisan organization that promotes constructive US leadership and engagement in international affairs based on the central role of the Atlantic community in meeting today's global challenges.

Atlantic Council

1030 15th Street, NW, 12th Floor,
Washington, DC 20005

(202) 463-7226, www.AtlanticCouncil.org