

A Tale of Two Crises

COVID-19, Climate Change, and Crisis Response

Daniel Farber

I INTRODUCTION

A viral pandemic and a change in global climate are utterly dissimilar in a physical sense. The pandemic is an abrupt emergency, while climate change is a long-term problem, though one requiring an urgent response. In a sense, both can be considered crises. Despite their differences, the pandemic and the climate crisis have many linkages. The response to the pandemic can impact the carbon emissions that drive climate change, while the pandemic's economic effect may prompt government responses which impact such emissions. In the meantime, efforts to respond to this public health crisis and to the climate crisis must both contend with the frailties of human nature and of existing political institutions.

Section I of this chapter investigates the effect of COVID-19 on carbon emissions. There was a sharp initial reduction in emissions, with the question being how much of this reduction, if any, will persist. Section II turns to the possible impact of economic recovery measures on climate change. Some jurisdictions planned green recoveries, which may succeed in accelerating the transition to a low-carbon economy. Part III discusses the governance issues that have arisen regarding climate change and the pandemic; these governance issues have proved remarkably similar. Part IV then offers some concluding thoughts about the relationship between these two global crises.

II THE IMPACT OF THE PANDEMIC ON CARBON EMISSIONS

The linkages between COVID-19 and climate change are complex. One connection involves fossil fuel consumption, which declined during lockdowns. Fossil fuel use is the primary cause of climate change, but may also indirectly increase susceptibility to COVID-19. Fossil fuels are also prime sources for ultra-fine particulates (known technically as PM_{2.5}) due to emissions by power plants and vehicles. Several studies connect past air pollution levels with COVID-19 mortality rates, which is not surprising given the general association between air pollution and susceptibility

to respiratory diseases. A 2019 study linked PM_{2.5} to 200,000 US deaths per year, mostly due to respiratory and cardiovascular issues.¹ A Harvard study found that an increase of one microgram per cubic meter in PM_{2.5} causes an 8 percent increase in the COVID-19 death rate.² Thus, jurisdictions that had taken steps to reduce carbon emissions may also have indirectly helped themselves in terms of the pandemic by reducing vulnerability due to PM_{2.5}.

Another indirect connection between COVID-19 and climate change relates to extreme weather events, which climate change has amplified. Certain disaster response efforts, including evacuations and mass sheltering, provide opportunities for viral contagion, helping exacerbate the pandemic.³

The most direct linkage, however, ties COVID-19 to economic dislocation and then to carbon emissions. It was initially expected that the economic shutdown associated with the virus would at least have the beneficial side effect of reducing carbon emissions. That direct effect on emissions seems to have been transitory. As we will see, however, some of the economic changes caused by the pandemic may have longer-lasting impacts on emissions.

Initially in China and then across the globe, the pandemic slashed economic activity and shut down transportation. By April 2020, emissions had fallen by about 17 percent globally and 25 percent in the United States.⁴ But by mid-June, global emissions had begun to recover, leading to a roughly 9 percent decline below 2019 levels in the first half of 2020. In the United States, the Energy Information Agency estimated a 10 percent drop in carbon emissions for 2020 as a whole, with a 6 percent rebound in 2021 as the economy recovered.⁵ Even if the 2020 emission cuts had

¹ Benjamin Bove et al., Burden of Cause-Specific Mortality Associated with PM_{2.5} Air Pollution in the United States, *JAMA Network Open* (Nov. 20, 2019), <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2755672>.

² Xiao Wu, Rachel C. Nethery, M. Benjamin Sabath, Danielle Braun & Francesca Dominici, Air Pollution and COVID-19 Mortality in the United States: Strengths and Limitations of an Ecological Regression Analysis, *Sci. Advances* (2020), <https://advances.sciencemag.org/content/6/45/eabd4049>. This result was consistent with the findings of other researchers. Id. For a survey of the literature, including studies from countries other than the United States, see Thomas Bourdrel, Isabella Annesi-Maesano, Barrak Alahmad, Cara N. Maesano & Marie-Abèle Bind, The Impact of Outdoor Air Pollution on COVID-19: A Review of Evidence from In Vitro, Animal, and Human Studies, 30 *Eur. Respir. Rev.* 200242 (2021).

³ Renee N. Salas, James Shultz & Caren G. Solomon, The Climate Crisis and Covid-19 – A Major Threat to the Pandemic Response, *New Eng. J. Med.* (July 15, 2020), www.nejm.org/doi/full/10.1056/NEJMp2022011.

⁴ Corinne Le Quére et al., Temporary Reduction in Daily Global CO₂ Emissions during the COVID-19 Forced Confinement, 10 *Nature Climate Change* 647 (2020).

⁵ US Energy Info. Agency, Short-Term Outlook (Nov. 10, 2020), www.eia.gov/outlooks/steo/. These estimates are based on data regarding fuel consumption and energy output. It is more difficult to detect the emission changes from measurements of atmospheric concentrations, partly because of the large seasonal variation in concentration levels. See also Zhu Liu et al., Near-Real-Time Monitoring of Global CO₂ Emissions Reveals the Effects of the COVID-19 Pandemic, *Nature Commc'ns* (Oct. 14, 2020), www.nature.com/articles/s41467-020-18922-7.

been permanent, they would have been far less than what is required to meet global emissions targets.⁶

In China, the world's largest carbon emitter, emissions dropped 20 percent in early 2020, but then rebounded by April 2020 to 2019 levels, or slightly above.⁷ The planning, permitting, and construction of new coal-fired power plants leaped in the first half of 2020.⁸ Yet the central government also announced efforts to prioritize clean energy, cross-province transmission, and flexibility measures.⁹ Thus, it is not clear how the pandemic will impact longer-term emissions growth.

The impact of the pandemic on the global oil industry was especially severe. Because of COVID-19-related restrictions on travel and the general economic downturn, oil prices crashed by almost 50 percent between December 2019 and March 2020.¹⁰ In some cases, prices went negative, with well owners having to pay to have oil taken off their hands.¹¹ At one point, some oil futures dropped momentarily to a price of negative \$37 as producers anticipated having to pay firms to take charge of their oil.¹² The price collapse seems to have accelerated trends in the industry due to the long-term prospects for oil usage. By June 2020, major oil companies such as Shell and BP were writing down the values of their oil and gas assets by tens of billions of dollars.¹³ In September 2020, BP announced a radical shift in its strategic planning, away from petroleum and toward renewable energy.¹⁴ The decline of the industry is mixed news in terms of emissions. The direct effect of a shift away from oil would clearly be beneficial. Yet there is also a risk connected with the economic decline of the industry. As demand declines, wells go out of use, and less solvent or

⁶ Alexander Kaufman, COVID-Related Emissions Drop “Just a Tiny Blip” in Long-term Climate Trends, Yale360, (Nov. 25, 2020), <https://e360.yale.edu/digest/covid-related-emissions-drop-just-a-tiny-blip-in-long-term-climate-trends>.

⁷ Liu et al., supra note 5, at fig. 2b.

⁸ Energy Monitor, A New Coal Boom in China: Country Accelerates New Coal Plant Permitting and Proposals (June 2020), <https://globalenergymonitor.org/wp-content/uploads/2021/01/China-coal-plant-brief-June-2020Eng.pdf>.

⁹ Id.

¹⁰ Frank Schneider & Allie Schwartz, The New World of COVID-19: Paradigm Shifts in the Oil and Gas Industry, Nat'l L. Rev. (Sept. 30, 2020), www.natlawreview.com/article/new-world-covid-19-paradigm-shifts-oil-and-gas-industry.

¹¹ Id.

¹² Id.

¹³ Danica Kirka, Shell Takes \$22 Billion Hit on Lower Oil, Gas Prices, Associated Press (June 30, 2020), <https://apnews.com/article/0d7adddd9a596eb2f34b736fce1f030>.

¹⁴ According to the *Washington Post*:

Led by a new chief executive, BP is trying to reinvent itself as an energy company in the age of climate change. The company is shrinking its oil and gas business, revving up offshore wind power and developing solar and battery storage. It is even considering installing electric car charging kiosks at its U.S. gas stations, part of a drive to eliminate or offset its carbon emissions to a net zero level by 2050.

Steven Mufson, Big Oil's Green Makeover, Wash. Post (Sept. 15, 2020), www.washingtonpost.com/climate-solutions/2020/09/15/bp-climate-change-transition/.

responsible operators may simply abandon marginal wells without properly capping them. Those abandoned wells may result in significant environmental problems, including leakage of methane, a potent greenhouse gas.¹⁵ Further uncertainties and additional strategic shifts took place in the aftermath of the Russian invasion of Ukraine, which abruptly raised global oil and gas prices.

The longer-term impacts of the pandemic on transportation remain uncertain. Telecommuting increased dramatically in some countries in the early days of the pandemic, with nearly all workers who were allowed to do so engaging in the practice.¹⁶ By September 2020, about 12 percent of those workers had returned to the workplace in the United States, although trends were quite different in various occupations. To the extent that telecommuting remains common after the pandemic, the result should be a decline in the carbon emissions associated with commuting. It also remains to be seen how much business and educational travel may be replaced by the use of electronic media even after the pandemic ends.

A more ominous possibility is a permanent decline in public transportation. During the pandemic, use of public transit declined precipitously, leaving public transportation systems in a perilous financial condition. Experts warn of the possibility that service cuts could send public transportation into a “death spiral” in which financial woes lead to service cuts, which decrease ridership and thereby lead to deeper financial distress.¹⁷ The end result could be to throw more riders back into cars, resulting in far greater emissions.

Forecasting the long-term impacts of COVID-19 on the economy or society more generally is difficult. It could result in permanent shifts in some economic sectors or in broader societal trends, such as increasing appreciation of the governmental role in controlling risk, the need for investment in public health, and deference to experts. Alternatively, it could turn out to be merely a blip in terms of longer-term trends, with little or no long-term impact. We have little precedent to draw upon in making predictions. The last pandemic of similar severity took place under very different circumstances over a century ago in the form of the 1918 influenza. As Robert Schiller, a Nobel-Prize winning economist, has pointed out: “Big events like

¹⁵ Emily Pontecorvo, Abandonment Issues, *Grist* (Dec. 1, 2020), <https://grist.org/energy/plugging-abandoned-oil-wells-carbon-offsets/>.

¹⁶ RAND Corp., Telecommuting and Work in the COVID-19 Pandemic: Are Workers Returning to the Workplace or Staying in Their Home Offices? (2020), www.rand.org/pubs/research_reports/RRA308-11.html. Internationally, the degree of telecommuting varied between countries, although complete global data does not seem to be available. In the European Union, telecommuting increased everywhere, but with substantial variations in the extent of the increase between countries. See Eur. Comm’n, Telework in the EU Before and After the COVID-19: Where We Were, Where We Head To (2020), https://ec.europa.eu/jrc/sites/default/files/jrc120945_policy_brief_-_covid_and_telework_final.pdf.

¹⁷ Christina Goldbaum & Will Wright, ‘Existential Peril’: Mass Transit Faces Huge Service Cuts Across U.S., *NY Times* (Dec. 6, 2020), www.nytimes.com/2020/12/06/nyregion/mass-transit-service-cuts-covid.html.

a pandemic have the potential to leave behind a trail of disruption. They can create social discord, reduce people's willingness to spend and take risks, destroy business momentum and shake confidence in the value of investments."¹⁸ Prediction is fraught even for experts. As Schiller explains, "[e]pisodes as far-reaching as this one are scarce, widely spaced in time, and so different in circumstances that statisticians cannot easily compare them systematically."¹⁹

III A PATH FORWARD

It is possible that the most important long-term climate effect of the pandemic, at least in some jurisdictions, will involve the economic recovery rather than the pandemic itself. Economic stimulus proved necessary to deal with the economic downturn. The biggest question was whether the economic recovery could be used to promote sustainability. Economic stimulus measures offer the opportunity for major investments in low-carbon technologies, which could accelerate the energy transition. Experience has shown permanent beneficial effects from stimulus spending on green infrastructure and energy-related research and development.

International institutions strongly advocated using the recovery to accelerate the energy transition away from fossil fuels. In a speech making the case for a green recovery, the deputy managing director of the International Monetary Fund said: "Let me end by emphasizing that the time to act, especially with lower oil prices, is now. The decisions we take now will shape economies and the global system for decades. Europe must, and is, setting a high bar that should galvanize action elsewhere."²⁰ Along the same lines, the International Energy Agency produced an ambitious green recovery plan requiring investment of \$3 trillion over three years.²¹ The agency estimated that its plan would increase global gross domestic product by 1.1 percent every year it was in effect, create nine million jobs per year, and result in a \$4.5 billion ton decrease in annual emissions by 2023.²²

One ambitious green stimulus to date has been adopted by the European Union.²³ Out of €1.8 trillion euro (\$2 trillion) in funding, almost a third of the spending targets climate action. The stimulus targets €91 billion euros per year for EU grants and loan guarantees for building improvements, such as rooftop solar panels and insulation, at least €20 billion for developing hydrogen as an energy source, another

¹⁸ Robert J. Shiller, *Why We Can't Foresee the Pandemic's Long-Term Effects*, NY Times, (May 29, 2020, updated Aug. 4, 2020).

¹⁹ *Id.*

²⁰ Tao Zhang, *Opening Remarks – COVID-19: Opportunities for a Green Recovery* (May 22, 2020), www.imf.org/en/News/Articles/2020/05/22/sp052220-opening-remark-zhang.

²¹ Int'l Energy Agency, *World Energy Outlook Special Report: Sustainable Recovery* (June 2020), www.iea.org/reports/sustainable-recovery.

²² *Id.*

²³ See Rhodium Grp., *It's Not Easy Being Green: Stimulus Spending in the World's Major Economies* 5 (Sept. 2, 2020), <https://rhg.com/research/green-stimulus-spending/>.

€20 billion for adding 15 gigawatts of renewable generation, €20 billion more for zero-emissions vehicles, and €40–60 billion for zero-emission trains.²⁴ The spending deal was greeted enthusiastically by the German environmental minister. She commented that: “[n]ever before, has so much of an EU budget been allocated to combating climate change. The commitments to climate action and environmental protection are important and necessary, but the distribution of funds must reflect that.”²⁵

Some individual European countries also invested heavily in a green recovery. About a third of Germany’s \$145 billion stimulus plan was directed to public transportation, electric vehicles, and renewable energy.²⁶ Meanwhile, France invested \$8.8 billion in a plan to become the main producer of electric vehicles in Europe.²⁷ In November 2020, the United Kingdom announced a plan for a “green industrial revolution,” with an investment of £12 billion, building on £5 billion committed to a green recovery.²⁸ Some countries have also imposed conditions on funding. Sweden required Scandinavian Airlines to accelerate its goal of a 25 percent reduction in emissions by five years, whereas the French required a 50 percent emission cut for Air France as a funding condition.²⁹

East Asia has seen significant green recovery efforts.³⁰ China is investing \$1.4 billion in charging infrastructure,³¹ and possibly much more in other green stimulus funding.³² Like China, Korea and Singapore are also emphasizing spending on

²⁴ Kate Abnett, Factbox: Key Climate Spending in EU’s ‘Green Recovery’ Plan, Reuters (May 27, 2020), www.bloomberg.com/news/articles/2020-07-21/eu-approves-biggest-green-stimulus-in-history-with-572-billion-plan. A key part of the plan is the €672 billion Recovery and Resilience Facility, which countries can tap to finance their recovery plans. Thirty-seven percent of the funds must be devoted to climate-related initiatives. Eur. Comm’n, The Recovery and Resilience Facility, https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en. The recovery plan builds on previous EU planning for a “Green Deal.” See Sebastiano Sabato & Boris Fronteddu, A Socially Just Transition Through the European Green Deal? (Aug. 2020), www.etui.org/publications/socially-just-transition-through-european-green-deal.

²⁵ Ewa Krukowska & Laura Millan Lombrana, EU Approves Biggest Green Stimulus in History With \$572 Billion Plan, Bloomberg Green (July 21, 2020), www.bloomberg.com/news/articles/2020-07-21/eu-approves-biggest-green-stimulus-in-history-with-572-billion-plan.

²⁶ Renee Cho, COVID-19’s Long-Term Effects on Climate Change – For Better or Worse (June 25, 2020), <https://news.climate.columbia.edu/2020/06/25/covid-19-impacts-climate-change/>.

²⁷ Id.

²⁸ Her Majesty’s Gov’t, The Ten Point Plan for a Green Industrial Revolution (Nov. 2020), www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution. Given that spending will extend until 2030, it is not clear how much of the funding should be considered “green stimulus,” though it is probably no coincidence that the plan was announced during the pandemic.

²⁹ Yamide Dagnet & Joel Jaeger, Not Enough Climate Action in Stimulus Plans (Sept. 15, 2020), www.wri.org/blog/2020/09/coronavirus-green-economic-recovery/.

³⁰ Alex Dewar, Raad Alkadiri, Rebecca Fitz & Jamie Webster, How COVID-19 is Changing the Pace of Energy Transitions 2 (Sept. 2020), <https://web-assets.bcg.com/4d/1b/fab91c1439bad272a22a8596952/bcg-how-covid-19-is-changing-the-pace-of-energy-transitions-sep-2020.pdf>.

³¹ Rhodium Grp., supra note 23, at 7. It can be difficult to separate recovery-related spending from background funding plans, given the general lack of transparency in China. Id.

³² See Dewar et al., supra note 30, at 5 (estimating \$200 billion in Chinese green stimulus measures).

electric vehicles.³³ Climate action also figured in recovery plans elsewhere. Nigeria's stimulus included \$620 million for rooftop solar, while Colombia's plan includes \$4 billion for zero-carbon energy and transmission.³⁴ It is possible, however, that the after-effects of the economic recession due to COVID-19, along with the economic dislocations caused by the Ukraine invasion, might impair the financial ability of some countries to address climate change going forward.

In terms of COVID-related spending, \$26 billion of the massive US COVID-19 spending program has been devoted to rail transit and mass transit, the only "green" components of the spending plan.³⁵ Subsequently, Congress passed major legislation with massive spending for infrastructure and climate-related incentives.³⁶ It is unclear how closely related these projects are to the COVID pandemic, since they are not framed in terms of pandemic response. The precedent of large scale spending set during the pandemic may, however, eased the way politically for this additional legislation.

Even if the direct effects of COVID-19 on emissions turn out to be transitory, a green stimulus may be more durable. Experience from the Great Recession provides at least suggestive evidence of long-term impacts from stimulus funding. On the heels of the 2008 financial crisis, the US Congress enacted a stimulus plan providing \$90 billion for renewable energy and energy efficiency.³⁷ By many accounts, that 10 percent chunk of the stimulus bill changed the trajectory of renewables in America. By 2011, the United States had reached the Energy Information Agency's forecast of US renewable capacity for 2030.³⁸ Due to the stimulus and other policy initiatives, "U.S. solar electricity generation increased over 30 times from 2008 to 2015, and wind generation has increased over three times."³⁹ Moreover, the "share of wind turbine equipment manufactured domestically rose from 25 percent in 2006–07 to 72 percent in 2012."⁴⁰

³³ Id. at 7–8. For a detailed description of Korea's ambitious plan, see Jae-Hyup Lee & Jisuk Woo, Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition, 12 *Sustainability* 10191 (2020), www.mdpi.com/2071-1050/12/23/10191/pdf.

³⁴ Dagnet & Jaeger, *supra* note 29.

³⁵ Rhodium Grp., *supra* note 23, at 6.

³⁶ On the new legislation and its effects, see The Rapid Policy Evaluation and Analysis Tool Kit project (REPEAT) at Princeton REPEAT, Preliminary Report: The Climate and Energy Impacts of the Inflation Reduction Act of 2022, at 7 (August 2022); Megan Mahajan, Olivia Ashmoore, Jeffrey Rissman, Robbie Orvis, and Anand Gopal, Modeling The Inflation Reduction Act Using The Energy Policy Simulator (Aug. 2022), https://energyinnovation.org/wp-content/uploads/2022/08/Modeling-the-Inflation-Reduction-Act-with-the-US-Energy-Policy-Simulator_August.pdf.

³⁷ Shannon Osaka, Obama's Recovery Act Breathed Life into Renewables. Now They Need Rescuing., *Grist* (June 1, 2020), <https://grist.org/energy/obamas-recovery-act-breathed-life-into-renewables-now-they-need-rescuing/>.

³⁸ Id.

³⁹ Joel Jaeger, Michael Westphal & Corey Park, Lessons Learned on Green Stimulus: Case Studies from the Global Financial Crisis 15 (Nov. 20, 2020), <https://wriorg.s3.amazonaws.com/s3fs-public/lessons-learned-on-green-stimulus-case-studies-from-the-global-financial-crisis.pdf>.

⁴⁰ Id. at 3.

Globally, there is also reason to believe that the green stimulus programs of the Great Recession strengthened national efforts significantly. According to researchers at the World Resource Institute, “[t]he United States, China, and Germany became renewable energy leaders in part because of programs coming out of the Great Recession.”⁴¹ Meanwhile, “China’s solar PV [photovoltaic] manufacturing capacity increased by a factor of 20 between 2007 and 2011.”⁴² Proof of causation is difficult given the difficulty of establishing the pathway that these countries would have taken absent the Great Recession. Nevertheless, the evidence is certainly suggestive of a causal link.

The EU and countries such as Korea are leveraging their pandemic recovery efforts to reduce their emissions and strengthen sectors of their economy relating to clean energy. Other countries may have allowed the opportunity to slip by. Still others lacked the resources to undertake green recovery efforts of their own. These heterogeneous responses may widen the gap between the laggards and the leaders in clean technologies and climate action.

Like public health responses to the pandemic, economic recovery efforts implicate national governance systems, as does climate policy. The next section discusses the lessons of the pandemic response for future efforts to control emissions. As it turns out, despite their very different natures, there are strong resemblances between the governance issues exposed by the pandemic and the governance challenges facing climate action.

IV THE PANDEMIC RESPONSE AND CLIMATE GOVERNANCE

What can we learn from COVID-19 about what works and does not work in governance?
How will COVID-19 impact future international cooperation?

While the COVID-19 crisis could end up advancing climate action, it has mixed lessons for climate governance. Like the response to climate change, the response to COVID-19 has been loosely coordinated at the international level and often featured bottom-up action by local jurisdictions. As the public health response to COVID-19 demonstrates, policies that require costly behavioral changes are difficult to implement, particularly over longer time periods.

Moreover, populist movements and leaders pose a challenge to global (and sometimes even national) cooperation. To be successful, climate governance will have to learn from the successes and failures of the coronavirus responses.

⁴¹ Id.

⁴² Id.; see also Dewar et al., *supra* note 30, at 2. For a survey of the available information about green stimulus during the Great Recession and discussion of methodological problems, see Shardul Agrawala, Damien Dussaux & Norbert Monti, What Policies for Greening the Crisis Response and Economic Recovery? Lessons Learned from Past Green Stimulus Measures and Implications for the COVID-19 Crisis 25–28 (May 2020), <https://doi.org/10.1787/e50f186f-en>. The economic benefits of green stimulus programs seem clear. Id. at 31.

Globally, the direct response to the pandemic has largely taken place at the national or regional level, with international institutions largely playing a supportive role.⁴³ Some nations responded vigorously to the crisis. In the United States, the Trump Administration did not press for aggressive public health measures in order to avoid burdening the US economy through public health measures.⁴⁴ President Trump also withdrew the United States from the World Health Organization (WHO).⁴⁵ State governments, to varying extents, implemented their own public health measures.⁴⁶ As with climate change, partisan and ideological affiliations are the main determinants of public attitudes toward public health responses to the pandemic.⁴⁷

The picture for climate policy is quite similar. Just as he withdrew the United States from the WHO, President Trump withdrew the country from the Paris Agreement.⁴⁸ As in the case of COVID-19, the Trump Administration prioritized the economy over addressing environmental problems.⁴⁹ The Trump Administration has also systematically eliminated prior federal efforts to reduce carbon emissions.⁵⁰ The lack of any sustained federal effort to address climate change created a policy vacuum.

⁴³ Mary Dobbs, National Governance of Public Health Response in a Pandemic?, 11 *Eur. J. Risk Reg.* 240 (June 2020). Apart from the WHO, international financial institutions such as the International Monetary Fund or regional development banks have also played significant roles. See David Klenert, Franziska Funke, Linus Mattauch & Brian O'Callaghan, Five Lessons from COVID-19 for Advancing Climate Change Mitigation 13 (Aug. 2020), <https://pubmed.ncbi.nlm.nih.gov/32836842/>.

⁴⁴ See Philip Bump, Scott Atlas Will Forever be the Face of Surrender to the Coronavirus, *Wash. Post.* (Dec. 1, 2020), www.washingtonpost.com/politics/2020/12/01/scott-atlas-will-forever-be-face-surrender-coronavirus/. Atlas is a retired physician who moved from being a health policy analyst at a conservative think tank to being President Trump's closest adviser on the pandemic.

⁴⁵ Katie Rogers & Apoorva Mandavilli, Trump Administration Signals Formal Withdrawal From W.H.O., *NY Times* (Oct. 22, 2020), www.nytimes.com/2020/07/07/us/politics/coronavirus-trump-who.html. For an overview of the role of the WHO and other international institutions in the pandemic context, see Armin von Bogdandy & Pedro Villarreal, International Law on Pandemic Response: A First Stocktaking in Light of the Coronavirus Crisis (Mar. 26, 2020), <https://ssrn.com/abstract=3561650>.

⁴⁶ Kirsten Engel, Climate Federalism in the Time of COVID-19: Can the States "Save" American Climate Policy?, 47 *N. Ky. L. Rev.* 115, 127 (2020). In Brazil, a similar dynamic took place, with individual states taking strong public health measures, despite the opposing view of the populist Bolsonaro regime. See Terrence McCoy, Should a Coronavirus Vaccine Be Mandatory? In Brazil's Most Populous State, It Will Be., *Wash. Post* (Dec. 7, 2020), www.washingtonpost.com/world/the_americas/virus-mandatory-vaccine-brazil-bolsonaro/2020/12/06/31767b4a-33e5-11eb-8d38-6aea1adb3839_story.html.

⁴⁷ Shana Kushner Gadarian, Sara Wallace Goodman & Thomas Pepinsky, Partisanship, Health Behavior, and Policy Attitudes in the Early Stages of the COVID-19 Pandemic (Mar. 27, 2020), <https://ssrn.com/abstract=3562796>.

⁴⁸ Lisa Friedman, U.S. Quits Paris Climate Agreement: Questions and Answers, *NY Times* (Nov. 4, 2020), www.nytimes.com/2020/11/04/climate/paris-climate-agreement-trump.html. For further discussion of the Paris Agreement, see Daniel A. Farber & Cinnamon P. Carlame, *Climate Change L.* 67–72 (2018).

⁴⁹ Engel, *supra* note 45, at 116.

⁵⁰ *Id.* at 119.

As with the pandemic response, climate action in the United States was largely bottom up, with the initiative coming from state and local governments.⁵¹ Unlike public health, where states have historically taken the lead (partly for constitutional reasons), environmental protection has generally been dominated by federal regulation. In a deviation from that pattern, states have addressed climate change on many fronts.⁵² They have also been active in promoting renewable energy, sometimes under the climate umbrella and sometimes independently. Many states have adopted renewable portfolio standards mandating that utilities obtain a certain percentage of electricity of the electricity they sell in the state from renewable sources. By forcing utilities to buy renewable energy, these mandates promote the development of more solar and wind energy.⁵³ There are significant variations in these standards from state to state.⁵⁴

Some states have gone further to reduce the use of fossil fuels by adopting cap and trade schemes. In 2006, Governor Arnold Schwarzenegger signed the California Global Warming Solutions Act, usually referred to as AB 32,⁵⁵ which required California to reduce emissions to the 1990 level by 2020. As another important example of state-level action to address climate change, nine eastern states combined to form the Regional Greenhouse Gas Initiative (RGGI, pronounced “Reggie”).⁵⁶ RGGI created a multi-state emissions trading system for power plant emissions with the goal of cutting emissions. This “polycentric” response has been characteristic of climate policy.⁵⁷

Both the efforts to combat climate change and the response to the pandemic have been hindered by the resurgence of populism in many parts of the world. Populist nationalism undermines international cooperation, which is essential for dealing with global threats such as pandemics and climate change. Populism also undermines faith in experts, leading to a willingness to disregard expert views in favor of misinformation. President Trump embodied both aspects of populism, but he was not alone. In Brazil, President Jair Bolsonaro followed a similar path for the coronavirus,⁵⁸ as well for climate change.⁵⁹ Though neither remain in office, the risks posed by populism continue.

⁵¹ *Id.* at 116–17.

⁵² For more about state climate-related policies, see Farber & Carlarne, *supra* note 47, at 185–89.

⁵³ Nat'l Renewable Energy Lab., Renewable Portfolio Standards (Mar. 21, 2020), www.nrel.gov/state-local-tribal/basics-portfolio-standards.html.

⁵⁴ SB 350 (de León), Chapter 8.5, Statutes of 2015, codified at Cal. Health & Safety Code § 44258.5 *et seq.*

⁵⁵ AB 32 (Nuñez), Chapter 488, California Statutes of 2006, codified at Cal. Health & Safety Code § 38500 *et seq.*

⁵⁶ See www.rggi.org/.

⁵⁷ Klenert et al., *supra* note 42, at 14.

⁵⁸ See Antonia Noori Farzan & Miriam Berger, Bolsonaro Says Brazilians Must not be ‘Sissies’ about Coronavirus, as ‘All of Us Are Going to Die One Day,’ Wash. Post. (Nov. 11, 2020), www.washingtonpost.com/world/2020/11/11/bolsonaro-coronavirus-brazil-quotes/.

⁵⁹ According to the *Guardian*, “Brazil’s foreign minister, Ernesto Araújo, has warned that climate change was a plot by ‘cultural Marxists[.]’ and President Jair Bolsonaro made a

Underlying the shared governance issues for climate change and the pandemic are psychological and sociopolitical commonalities. Humans can be taken unaware in situations where change is not linear but instead shows dramatic or exponential growth.⁶⁰ They can also do poorly with respect to anticipating that their own actions can unintentionally cause great harm.⁶¹ These psychological issues have been amplified by political divisions. Just as they are often more skeptical of vigorous political action to address climate change, those on the political right tended toward delayed responses to the disease, resisted stringent control measures, and were receptive to early termination of control measures.⁶² Conservative media have played a significant role in fostering these attitudes, even controlling for the ideology of the audience members.⁶³ This political divide has been most obvious in the United States, but is echoed elsewhere in the world.⁶⁴ Political preferences plus psychological barriers have combined to provide fertile ground for conspiracy theories stoked by Internet misinformation efforts.⁶⁵

Both crises also share a common hope that technological advances may be crucial to long-term solutions, meaning vaccines in the case of COVID-19 and advanced energy technologies in the case of climate change. But technology is not a *deus ex machina* that will save the day on its own. People must be educated about the value of vaccines, and hundreds of millions (ultimately billions) of doses must be distributed and administered. The emergence of variants may require continued advances in vaccine design and renewed efforts by governments to ensure the manufacture and broad distribution of subsequent booster shots. With regards to climate change, coordinated changes must be made in electricity systems along with incentives to abandon existing assets in favor of massive new investments. Thus, government policy will retain a critical role in both crises.

V CONCLUSION

The COVID-19 outbreak has several links with the issue of climate change. The restrictions adopted in many places in response to the coronavirus caused an immediate decline in carbon emissions, although the impact on emissions faded over time. The effect on the transportation system may prove longer lasting, perhaps for

campaign promise to pull Brazil out of the Paris climate accord before reluctantly backing off.” Dom Phillips, Resistance to the ‘Environmental Sect’ is a Cornerstone of Bolsonaro’s Rule, *Guardian* (July 27, 2020), www.theguardian.com/global-development/2020/jul/27/resistance-to-the-environmental-sect-is-a-cornerstone-of-bolsonaro-rule-brazil.

⁶⁰ See Klenert et al., *supra* note 42, at 7.

⁶¹ *Id.* at 9.

⁶² *Id.* at 14.

⁶³ See Christopher Avery et al., An Economist’s Guide to Epidemiology Models of Infectious Disease, 35 *J. Econ. Persp.* 79, 99–100 (2020).

⁶⁴ Klenert et al., *supra* note 42, at 14.

⁶⁵ *Id.* at 15–16.

good (in substituting virtual meetings for physical ones) and for bad (in undermining public transit). In some places, green recovery programs may provide a route to accelerating the energy transition, with long-term economic and environmental effects. Thus, the longer-term effects of the pandemic on emissions remain uncertain but are likely to be mixed on balance.

Despite their obvious differences, the pandemic and the climate crisis have encountered similar governance institutions and political trends, and with similar effects. Bottom-up governance has featured heavily in both responses, with nations and subnational jurisdictions playing the leading roles. Efforts to respond to both crises have run into headwinds due to the global upsurges in nationalism and populism, which have frustrated efforts at global cooperation and undermined support for the measures recommended by experts. Unfortunately, there is no solution in sight to the weaknesses in governance systems, which will continue to be a source of frustration. At the same time, we can take some satisfaction from the partial successes which we have been able to achieve, despite the frailties of human nature and the flaws in human governance.