The Paris Agreement in the 2020s: Breakdown or Breakup?

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Just four years after the adoption of the Paris Agreement, there are serious warning signs that the Agreement could unravel in the 2020s. Not only did President Trump's 2017 withdrawal announcement damage the universality and reciprocity of the Agreement, but many parties are not on track to reach their own voluntary carbon reduction pledges.

This Article shows how and why the Paris Agreement could falter. I explore the recent stressors on the Agreement and challenge the dominant scholarly narrative that I call the "peer pressure proposition"—the view that international peer pressure will encourage parties to ramp up their pledges over time. Highlighting the flawed assumptions of the peer pressure proposition, I provide a more nuanced, pragmatic account of the prospects for cooperation under the Agreement in the 2020s.

While no outcome can be predicted with certainty, I argue that policymakers will plausibly face a Breakdown scenario in the next decade, where the Paris Agreement lapses into ineffectiveness, or even a Breakup scenario, where the Paris Agreement collapses and parties withdraw or disengage. Either scenario would be ecologically devastating, and I explore the implications of both scenarios for international law and the climate change regime.

DOI: https://doi.org/10.15779/Z38H708140

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INTRODUCTION

The Paris Agreement is widely hailed as a triumph of international diplomacy.[1] After twenty years of contentious United Nations climate summits that failed to slow the rise in greenhouse gas (GHG) emissions, the Agreement quickly entered into force and now has near-universal adherence. Over 180 nations have made voluntary pledges to reduce their GHG emissions, with the collective goal of limiting global warming to "well below" two degrees Celsius.[2] In the wake of the 2015 Paris conference, most diplomats and international law scholars asserted that the Agreement's voluntary structure could succeed.[3] In any case, there was no viable alternative. Paris *had* to succeed.

1. UN Secretary-General Ban Ki-moon described the Paris Agreement as a "monumental triumph for people and our planet" that is "ambitious, flexible, credible and durable." COP-21: UN chief hails new climate change agreement as "monumental triumph", UN News Centre, 12 Dec. 2015, http://www.un.org/apps/news/story.asp?NewsID=52802#.Vx3cdKv87ww; Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.

2. Paris Agreement, *supra* note 1, at art. 2. The full statement of the treaty's objective is to keep global warming to "well below" 2 degrees Celsius compared to preindustrial temperatures while "pursuing efforts" to limit the temperature increase to 1.5 degrees Celsius, "recognizing that this would significantly reduce the risks and impacts of climate change." *Id.*

3. *See* Cinnamon P. Carlane & J.D. Colevecchio, *Balancing Equity and Effectiveness: The Paris Agreement & the Future of International Climate Change Law* 4–5 (Ctr. for Interdisc. Law & Pol'y Stud., Working Paper No. 477, 2019); *see also* John C. Dernbach & Donald A. Brown, *Making the Paris Agreement Work* (The Environmental Forum, Research Paper No. 15-42, Aug. 2016); *The Road to a Paris*

Just four years after diplomats drew this line in the sand to limit emissions, it could be swamped by a rising tide. As we enter the 2020s, the Agreement has been unable to constrain the world's emissions growth. Many parties are falling short even of their initial, modest pledges to reduce emissions, called Nationally Determined Contributions (NDCs). Global GHG emissions, which flattened between 2014 and 2016, are once again surging to record annual highs.[4]

Climate change politics have turned markedly darker since 2015. In 2017, President Donald Trump announced that the United States—the second largest GHG emitter—would withdraw from the Agreement,[5] and in 2019, the State Department formally submitted the U.S. withdrawal.[6] These moves dashed hopes that major emitters would be role models for ambitious policies, and global media outlets aptly characterized Trump as raising his middle finger to the rest of the world.[7]

Commitments to aggressive climate action are also faltering elsewhere. In 2018, Brazilian voters elected right-wing populist President Jair Bolsonaro, a Trump acolyte who campaigned on withdrawing Brazil from the Agreement.[8] The 2019 Australian elections were a referendum on changing the country's weak climate policies, and voters returned the pro-coal conservative coalition to power.[9] In France, a new fuel tax equivalent to twenty-five cents per gallon led to the "yellow vest" riots of 2018.[10]

These developments took place against a backdrop of increasingly dire warnings from scientists. In 2018, the Intergovernmental Panel on Climate

Climate Change Deal, N.Y. TIMES (Dec. 11, 2015), https://www.nytimes.com/interactive/projects/cp/climate/2015-paris-climate-talks/the-end-game-france-aims-for-final-climate-deal-draft-on-saturday; Alexandra Zavis et al., *Nearly 200 Nations Join Together to Fight Climate Change in Historic Paris Agreement*, L.A. TIMES (Dec. 12, 2015), http://www.latimes.com/world/europe/la-fg-climate-talks-20151212-story.html.

4. In May 2019, the concentration of atmospheric greenhouse gases surpassed 415 parts per million, the highest concentration in at least 3 million years. The atmospheric GHG concentration is now 40 percent higher than in 1990, when international climate change negotiations began under UN auspices. *See* Nat'l Oceanic & Atmospheric Admin., *NOAA's Greenhouse Gas Index Up 40 Percent Since 1900* (July 11, 2017), https://www.noaa.gov/news/noaa-s-greenhouse-gas-index-up-40-percent-since-1990.

5. Michael Grunwald, *Why Trump Actually Pulled Out of Paris*, POLITICO (June 1, 2017), https://www.politico.com/magazine/story/2017/06/01/why-trump-actually-pulled-out-of-paris-215218.

6. Lisa Friedman, *Trump Serves Notice to Quit Paris Climate Agreement*, N.Y. TIMES (Nov. 4, 2019), https://www.nytimes.com/2019/11/04/climate/trump-paris-agreement-climate.html.

7. Greg Sargent, *Trump Just Gave the World the Middle Finger*, WASH. POST (June 2, 2017), https://www.washingtonpost.com/blogs/plum-line/wp/2017/06/02/trump-just-gave-the-the-world-the-middle-finger-heres-what-has-to-happen-now/; Max Boot, *Trump May Rue His Middle Finger to Europe*, FOREIGN POL'Y (June 6, 2017), https://foreignpolicy.com/2017/06/06/trump-may-rue-his-middle-finger-to-europe/.

8. Bruce Douglas, *Brazil's President-Elect Questions Paris Climate Deal Again*, BLOOMBERG (Dec. 12, 2018), https://www.bloomberg.com/news/articles/2018-12-12/brazil-s-president-elect-questions-paris-climate-accord-again.

9. *Id.*; Damien Cave, *It Was Supposed to be Australia's Climate Change Election, What Happened?* N.Y. TIMES (May 19, 2019), https://www.nytimes.com/2019/05/19/world/australia/election-climate-change.html.

10. Adam Nossiter, *France Suspends Fuel Tax Increase That Spurred Violent Protest*, N.Y. TIMES (Dec. 4, 2018), https://www.nytimes.com/2018/12/04/world/europe/france-fuel-tax-yellow-vests.html.

Change (IPCC) released a long-awaited report showing that the impacts of warming above 1.5 degrees Celsius will be catastrophic and that governments have just twelve years to slash emissions by nearly 50 percent to stay on a trajectory to avoid that outcome.[11]

This is the context in which the Agreement enters the 2020s, and it is not an optimistic one. The Agreement, which was designed to last decades, is still getting off the ground, and it is too early to write it off as doomed to failure. But these warning signs bode poorly for the coming decade, when the necessary emissions cuts are far more stringent than any nation has ever attempted.

Can the Agreement succeed against this backdrop? The appropriate metric for success, it should be acknowledged, is not whether the Agreement can "solve" climate change in the 2020s, or even later. Rather, it is whether the Agreement can sustain political commitments to meaningful emissions reductions through the 2020s and beyond.[12] But even by that metric, there are signs that the Agreement could falter.

In this Article, I argue that within the next decade, the Agreement could plausibly fall into a downward spiral of dissent, dysfunction, and disengagement. My goal is to identify the causes of a downward spiral, sketch possible scenarios, and analyze the potential impact of a downward spiral on the environment, international law, and the global climate change regime. While other scholars have noted the possibility of the Agreement's failure,[13] I show how and why failure could unfold.

My arguments challenge the conventional scholarly narrative that the Agreement will succeed because parties will pressure each other, in a kind of virtuous circle, toward increasingly deep emissions cuts—a view that I call the "peer pressure proposition." Many of the assumptions behind the peer pressure proposition are faulty, and in the wake of the United States' withdrawal, the role of peer pressure in the Agreement needs critical analysis. In this Article, I provide a fuller, more pragmatic account of why nations will cooperate—or not cooperate—as the necessary emissions cuts become steeper and costlier.

11. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT: GLOBAL WARMING OF 1.5 C, SUMMARY FOR POLICY MAKERS 14 (2018) [hereinafter IPCC SUMMARY]; Chris Mooney & Brady Dennis, *The World Has Just Over a Decade to Get Climate Change Under Control, U.N. Scientists Say*, WASH. POST (Oct. 7, 2018), https://www.washingtonpost.com/energy-environment/2018/10/08/world-has-only-years-get-climate-change-under-control-un-scientists-say/?utm_term=.4473266e094e; Justin Worland, *Scientists Just Laid Out Paths to Solve Climate Change. We Aren't on Track to Do Any of Them*, TIME (Oct. 8, 2018), http://time.com/5418134/ipcc-climate-change-report-2030-crisis/.

12. Robert Falkner, *The Paris Agreement and the New Logic of International Climate Politics*, 92 INT'L AFF. 1107, 1119 (2016) (arguing that the Paris Agreement should be judged on whether "it provides a robust yet adaptable framework for developing and sustaining long-term political commitment to an effective global response").

13. *See* Miranda A. Schreurs, *The Paris Climate Agreement and the Three Biggest Emitters: China, the United States, and the European Union,* 4 POL. & GOVERNANCE 219, 222 (2016); Oran R. Young, *The Paris Agreement: Destined to Succeed or Doomed to Fail?,* 4 POL. & GOVERNANCE 124, 132 (2016); Harro van Asselt, *International Climate Change Law in a Bottom-Up World*, 6 QIL 26 (2016).

After describing the potential for a downward spiral and the factors provoking it, this Article explores two possible ways that a downward spiral could unfold in the 2020s.

The first possible scenario is what I call "Breakdown." In Breakdown, the Agreement would still remain the premier international forum for climate change negotiations, but its impact on reducing global emissions would be modest. In the 2020s, parties may fall short of their own GHG reduction pledges, reduce the ambition of their future pledges, or purposely slow-walk pursuing their goals out of frustration with the progress of other parties. As parties recognize their inability to halt the global rise of climate-disrupting emissions after a decade of implementing the Agreement, acrimony and dissension will increase.

A second possible scenario for the 2020s is what I call "Breakup"—the collapse of the Agreement. Breakup could occur through environmental shocks to the system (such as heat waves, flooding, crop loss, ice sheet collapse, or mass migrations). These calamities would highlight that the slow pace of reductions under the Agreement, and its voluntary architecture, will not meaningfully address climate disruption.[14] In Breakup, parties may formally withdraw from or otherwise abandon the Agreement. Committed nations might seek alternative arrangements, such as acting through smaller "clubs" of nations with common interests[15] or using financial power, trade sanctions, or border taxes to compel GHG reductions by other states.[16]

Breakup could also result from longstanding disputes between developing and developed countries. Developing countries may exit en masse from the Agreement if promised funding from developed countries never materializes or if major industrialized emitters fall short of their pledges. Breakup could occur if major emitters follow the United States and withdraw from the Agreement, or if the United States never rejoins it. The 2020 U.S. election will be pivotal in determining the probability of Breakup.

There is, of course, a third possible scenario—which I call an "upward spiral." In this scenario, the Agreement works as intended and governments commit to, and achieve, progressively deeper emissions reductions. It is possible that dramatic improvements in energy efficiency, renewable energy deployment,

14. *See* Young, *supra* note 13, at 124 (noting that public arousal around climate change would increase dramatically if there is "some sort of climate shock that jolts wide swaths of the public into taking climate change seriously").

15. *See, e.g.*, David Victor, *Making the Promise of Paris a Reality*, *in* THE PARIS AGREEMENT AND BEYOND: INTERNATIONAL CLIMATE CHANGE POLICY POST-2020 15 (Robert N. Stavins & Robert C. Stowe eds., Harv. Project on Climate Agreements 2016) (noting the transaction costs of bargaining among large groups of countries and suggesting that progress is likely to come from smaller groups).

16. Brian Flannery et al., Framework Proposal for a U.S. Upstream Greenhouse Gas Tax with WTO Compliant Border Adjustments 1 (Resources for the Future Working Paper 2018), https://www.rff.org/publications/working-papers/framework-proposal-for-a-us-upstream-greenhouse-gas-tax-with-wto-compliant-border-adjustments/; see also David A.C. Bullock, *Combating Climate Recalcitrance: Carbon-Related Border Tax Adjustments in a New Era of Global Climate Governance*, 27 WASH. INT'L L. J. 609 (2018) (advocating carbon border taxes).

or battery storage in the 2020s could spur an upward spiral.[17] Carbon capture systems could emerge at scale.[18] Citizens could mobilize to pressure their governments toward stringent emissions cuts. If so, all of these developments would facilitate global cooperation, and the Agreement can be effective if it can ride on these opportunities.

This optimistic scenario (which is the intended vision of the Agreement) has been extensively explored elsewhere,[19] and it is not my purpose to explore it here. Given the challenges of the 2020s, states must be prepared for the possibilities of Breakdown and Breakup.

To be clear, I do not contend that any specific language in the Agreement will cause Breakdown or Breakup, or that tweaks to the language could avoid a downward spiral. Rather, the destabilizing factors are exogenous to the Agreement and reflect the strategic interests of major powers. The problem is not the treaty's language. It is that climate change, by its very nature, creates thorny, intractable incentives toward noncooperation and free riding.[20] Climate change is the ultimate intragenerational and intergenerational prisoners' dilemma.[21] The Agreement may have papered over these conflicts for a while, but it has not solved them.

This Article proceeds as follows: In Part I, I discuss the original vision of the Agreement and specifically how its "ratchet mechanism" was intended to raise the ambition of GHG-reduction pledges over time. In Part I, I also interrogate the concept of the "peer pressure proposition," which many hope will sustain progress under the Agreement. I discuss reasons for skepticism and conclude that peer pressure is unlikely to propel states toward achieving the temperature goals of the Agreement.

In Part II, I explore the major tensions in the international climate regime that have arisen since 2015, tensions that call into question both the ratchet mechanism and the peer pressure proposition. I focus on the impact of the U.S.

17. *See* Raymond Clémencon, *The Two Sides of the Paris Climate Agreement: Dismal Failure or Historic Breakthrough?*, 25 J. OF ENV'T & DEV. 3, 20 (2016); *see also* Fergus Green, *This Time is Different: The Prospects for an Effective Climate Agreement in Paris 2015*, CTR. FOR CLIMATE CHANGE ECON. & POL'Y 25 (2014), http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/10/This-Time-is-Different.pdf.

18. Pete Smith, *Soil Sequestration and Biochar as Negative Emission Technologies*, 22 GLOBAL CHANGE BIOLOGY 315, 315–24 (2016); Duncan McLaren, *A Comparative Global Assessment of Potential Negative Emissions Technologies*, 90 PROCESS SAFETY & ENVTL. PROTECTION 489, 489–500 (2012).

19. *See, e.g.*, Niklas Höhne et al., *The Paris Agreement: Resolving the Inconsistency Between Global Goals and National Contributions*, 17 CLIMATE POL'Y 16, 17 (2016); Peter Christoff, *The Promissory Note: COP 21 and the Paris Climate Agreement*, 25 ENVTL. POLITICS 765, 778 (2016); Falkner, *supra* note 12, at 1119.

20. *See* Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1183 (2009); Robert O. Keohane & David G. Victor, *Cooperation and Discord in Global Climate Policy*, 6 NATURE CLIMATE CHANGE 1, 1 (2016); Robert O. Keohane & Michael Oppenheimer, *Paris: Beyond the Climate Dead End Through Pledge and Review?*, 4 POL. & GOVERNANCE 1, 3 (2016).

21. Stephen M. Gardiner, *A Perfect Moral Storm: The Tragedy of Climate Change*, 11 CROATIAN J. PHIL. 376, 376–82 (2011).

withdrawal from the Agreement, the likelihood that parties will not achieve their existing NDCs, the alarming scientific reports about the dramatic scale of emissions reductions that must occur in the 2020s, and financial conflicts among the parties.

Given these recent trends, Part III explores how Breakdown and Breakup scenarios could unfold. I assess the implications of Breakdown and Breakup for international law and show how the near-term stressors on the Agreement could result in its unraveling.

I. THE PARIS RATCHET AND THE PEER PRESSURE PROPOSITION

To understand the current tensions in the climate change regime, it is important to understand the original vision of the Paris Agreement: a vision of progress building upon progress. Under the Agreement's "pledge and review" system, parties made initial national emissions reductions pledges in 2015-2016. Parties are scheduled to review their progress in meeting these pledges every five years, beginning in 2023. As progress is documented, the expectation is that parties will scale up their pledges to provide an aggregate reduction in GHG emissions sufficient to limit warming to "well below" 2 degrees Celsius, the temperature goal of the treaty.[22] This vision requires trust, transparency, and flexibility.

The parties have already taken the first step in that vision. To date, 184 nations have submitted NDCs.[23] These NDCs are typically phrased as national goals to achieve specified percentage reductions in emissions when compared against a baseline year (for example, 25 percent reduction below a nation's 2005 emissions levels by 2030). Many developing nations' NDCs detail specific actions that the country will undertake. Chile, for example, committed to reforesting land.[24] China committed to promoting renewable energy.[25] India committed to both.[26]

22. Andrew Frank, *The Promissory Note: COP 21 and the Paris Climate Agreement*, 25 ENVTL. POL. 765, 787 (2016); Höhne et al., *supra* note 19, at 24.

23. *See, e.g.*, Nationally Determined Contribution Registry, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, https://www4.unfccc.int/sites/NDCStaging/pages/All.aspx [hereinafter NDC Registry].

24. Nationally Determined Contribution Registry, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, *Intended Nationally Determined Contribution of Chile Towards the Climate Agreement of Paris 2015* 13 (Sept. 2015), http://www4.unfccc.int/ndcregistry/PublishedDocuments/Chile%20First/INDC%20Chile%20english%20version.pdf.

25. Nationally Determined Contribution Registry, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, *Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions* 13 (2015), http://www4.unfccc.int/ndcregistry/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf.

26. Nationally Determined Contribution Registry, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, *India's Intended Nationally Determined Contribution: Working Towards Climate Justice* 9–17 (2015), http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf.

The Agreement requires, as a binding treaty obligation, that each party submit an NDC and report on its progress.[27] However, at the insistence of the Obama Administration, which cited the need to avoid Senate ratification, there is no legally binding requirement to actually *achieve* the goals set forth in an NDC.[28] It is up to each party to implement policies to achieve its NDC, and there is no sanction for failing to reach the target.

The nonbinding nature of NDCs has several consequences that make the Paris Agreement fragile and prone to defections. States cannot compel other states to submit an ambitious NDC or punish states for falling short. There is nothing in the Agreement, moreover, that requires a party to justify its NDC in relationship to reaching the treaty's overall two-degree goal. No provision requires a party to show, for example, that its pledge, in coordination with other nations making a similar level of effort, would achieve this temperature goal. The treaty allows governments to set pledges solely on the basis of domestic convenience and capability. Seen in this light, as Anne-Marie Slaughter has noted, the Agreement is mainly a "statement of good intentions."[29]

The parties opted for this voluntary approach because a "tougher" agreement with binding targets and enforceable sanctions would not have attracted the participation of major emitters, including the United States.[30] Many proponents of the Agreement contend that it was the best that could have been achieved in 2015, after years of fruitless negotiation on legally binding targets and timetables.[31] The voluntary structure was also the natural evolution of negotiations since 2009 that centered on a pledge-and-review approach.[32]

The Agreement's lack of bindingness has been lauded on the grounds that states' GHG-reduction pledges are likely to be more ambitious than commitments states would submit under an alternative, legally binding regime

27. *See* Paris Agreement, *supra* note 1, at art. 4.

28. Making the NDCs legally binding would have triggered the need for ratification of the Paris Agreement by the U.S. Senate. *See* Daniel Bodansky, *The Paris Climate Change Agreement: A New Hope?*, 110 AM. J. INT'L L. 288, 296 (2016); John Vidal, *How a Typo Nearly Derailed the Paris Climate Deal*, THE GUARDIAN (Dec. 16, 2015), https://www.theguardian.com/environment/blog/2015/dec/16/how-a-typo-nearly-derailed-the-paris-climate-deal. Some scholars have argued that even as adopted, with nonbinding NDCs, the Paris Agreement should have been submitted for Senate ratification because President Obama had no authority to enter into the Agreement as an Executive Agreement. *See* Eugene Kontorovich, *Exiting Paris: What the Climate Accord Teaches about the Features of Treaties and Executive Agreements*, 51 CASE WESTERN RESERVE J. INT'L L. 103, 118 (2019) (arguing that with this constitutional infirmity, "President Trump did not quit the Paris Accord because the U.S. was never in it in the first place").

29. *See* Anne-Marie Slaughter, *The Paris Approach to Global Governance,* PROJECT SYNDICATE (Dec. 28, 2015), https://www.project-syndicate.org/commentary/paris-agreement-model-for-global-governance-by-anne-marie-slaughter-2015-12; *see also* Christoff, *supra* note 19, at 765 (the Agreement is a "promissory note" whose "value remains unclear").

30. Green*, supra* note 17, at 5.

31. *See generally id.* at 4; Clémencon, *supra* note 17, at 5.

32. Bodansky, *supra* note 27, at 289–90 (noting that the "paradigm shift" occurred at the 2009 Copenhagen conference where the parties abandoned the Kyoto Protocol's legally binding architecture); Christoff, *supra* note 19, at 767.

with tough sanctions.[33] As the IPCC has explained, "states may prefer [that] legally binding agreements . . . embody less ambitious commitments, and [states] may be willing to accept more ambitious commitments when they are less legally binding."[34] Voluntary pledges could be more effective in the long run than mandatory, legally binding commitments of lesser magnitude.

The problem with relying on voluntary pledges, however, is that if the aggregate emissions reductions expected under the NDCs are insufficient to keep warming within tolerable levels, there is no stick to force states to commit to greater reductions. We now have a short window of time to slash global GHG emissions, but the Agreement offers no mechanism to force emissions reductions on parties or even to allocate effort among the parties. It rests on the vicissitudes of voluntary action, with each party deciding how much effort it is willing to make.

The emissions gap—the shortfall in the sufficiency of the voluntary pledges—was obvious at the Paris conference. Analysts quickly predicted that if all the NDCs submitted under the Agreement in 2015-2016 were fully implemented by 2030 (which is highly unlikely), global temperatures would increase 2.7 to 3.5 degrees Celsius beyond preindustrial levels,[35] a catastrophic level of warming. Negotiators knew that the voluntary pledges were nowhere near sufficient to achieve the ultimate goal of the treaty: keeping global warming to "well below" 2 degrees Celsius compared to preindustrial temperatures and "pursuing efforts" to limit the temperature increase to 1.5 degrees Celsius.[36]

The parties took what they could get in 2015, fully aware of this emissions gap, and hoped the Agreement would spur collective progress over time.

The long-term success of the Agreement therefore depends on the optimistic vision of what I call an "upward spiral," where early-stage cooperation at Paris will result in parties making progressively more ambitious commitments in the future. As parties work toward reasonably achievable NDCs and continue to

33. *See* Kal Raustiala, *Form and Substance in International Agreements*, 99 AM. J. INT'L L. 581, 603 (2005); *see also* DAVID VICTOR, GLOBAL WARMING GRIDLOCK: CREATING MORE EFFECTIVE STRATEGIES FOR PROTECTING THE PLANET 74 (2011).

34. Robert Stavins et al., *International Cooperation: Agreements and Instruments* (Climate Change 2014: Mitigation of Climate Change, Working Group III 27 2014).

35. *See* U.N. COP21, *Frequently Asked Questions* (2015), https://www.un.org /sustainabledevelopment/wp-content/uploads/2015/10/COP21-FAQs.pdf (explaining that even with the full implementation of NDCs, Earth's temperature is predicted to increase by 2.7 to 3.5 degrees Celsius depending on the assumptions used to model predictions); Simon Evans, *UN report: Climate pledges fall short of cheapest route to 2C limit*, CARBON BRIEF (Oct. 30, 2015, 5:51 PM), https://www.carbonbrief.org/un-report-climate-pledges-fall-short-of-cheapest-route-to-2c-limit (discussing sources that estimate that Earth's temperature will increase by 2.7 to 3.5 degrees Celsius). *But see* U.N. Environment Programme, *The Emissions Gap Report 2016*, U.N. Doc. DEW/2061/NA (Nov. 2016), http://wedocs.unep.org/bitstream/handle/20.500.11822/10016/emission_gap_report_2016.pdf ?sequence=1&isAllowed=y (explaining that even if all parties' NDCs are fully implemented, Earth's temperature will increase by 3.0 to 3.2 degrees Celsius by 2100).

36. Paris Agreement, *supra* note 1, at art. 2.

build trust, they may be willing to make deep cuts in emissions, secure in the knowledge that other parties are making similar sacrifices.

This vision of an upward spiral in turn depends on two assumptions: first, that the so-called "ratchet mechanism" of the Agreement will operate as intended, and second, that pressure from other parties to aim higher in the ambition of NDCs, which I call the "peer pressure proposition," will be sustained over several decades.

Both of these assumptions are attractive, widely held, and wrong.

A. The Paris Agreement's Ratchet Mechanism

The ratchet mechanism refers to the provisions of the Paris Agreement that require parties to submit progressively more "ambitious" NDCs over time. "Ambitious" in this context means NDCs that commit a state to progressively deeper GHG emissions cuts or, for many developing states, NDCs that allow an increase in expected emissions, but at a slower rate than current projections.

The ratchet mechanism is crucial to slowing climate disruption. It is the only internationally adopted legal text that encourages parties to reduce their GHG emissions over a multidecade timespan.

The ratchet mechanism is not spelled out in any single article of the Agreement. Rather, the "ratchet" results from a collection of scattered provisions, including the following:

- Each Party shall "prepare, communicate and maintain successive nationally determined contributions that it intends to achieve."[37]
- Each Party's successive NDCs "will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition . . . ."[38]
- Each Party shall regularly provide information on national inventories and information "necessary to track progress made in implementing and achieving" its NDC.[39]
- A Party may at any time "adjust" its NDC "with a view to enhancing its level of ambition."[40]
- Beginning in 2023 and every five years thereafter, the parties shall "take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of [the] Agreement and its long-term goals . . . ."[41]
- Parties will then submit successive NDCs "informed by the outcomes of the global stocktake[s] . . . ."[42]

37. *Id.* at art. 4.
38. *Id.*
39. *See id.* at art. 13.
40. *Id.* at art. 4.
41. *Id.* at art. 14.
42. *Id.* at art. 4.

These provisions, though skeletal, suggest how the parties expect an upward spiral to unfold. They create a detailed timeline in which the parties will submit NDCs, prepare emissions inventories at least every two years, take stock every five years of progress under the Agreement (2023, 2028, etc.), and submit pledges that "represent a progression beyond the Party's then current [NDC]" in 2020, 2025, 2030, and so on.[43]

Some scholars believe that parties will follow the ratchet mechanism quite literally, even if domestic circumstances are unfavorable. Christina Voigt, for example, has argued that even if a party were in a "financial, political or economic crisis," there would be no grounds for "a decrease in what can be considered its 'highest possible ambition' compared to the level contained in the previous NDC."[44] According to Voigt, each submission of an NDC sets a "floor" for the next NDC.[45] Every party is required to go above and beyond its previous NDC with each new submittal.[46]

Voigt suggests that the Agreement somehow locks in an upward spiral of progressively more ambitious commitments. But this optimism is misplaced. The text of the ratchet is not self-executing. Given the lack of penalties for failing to achieve NDCs, parties still face strong incentives to defect or free ride under the Agreement, to pledge only minimal action, or to appear to take action while actually imposing few costs on their domestic interest groups. Many states—especially those in "financial, political, or economic crisis"—will prioritize the needs of their domestic constituencies over their voluntary, nonbinding Agreement pledges.

In short, the ratchet mechanism is a necessary but not sufficient condition for a consistent, upward trajectory of NDCs. Parties must somehow be incentivized to stick with it.

B. The Peer Pressure Proposition and Its Fallibility

According to many scholars, peer pressure will be the glue that holds the Agreement together.[47] Under the pledge-and-review system, parties will feel pressure from other parties to submit and achieve progressively more ambitious NDCs. Additionally, the ratchet mechanism could be sustained if parties fear reputational costs for noncooperative behavior, such as failing to achieve their own NDCs. If parties perceive that others are making progress toward their respective NDCs at each review conference, they will be more willing to

43. *Id.*; *see also* Bodansky, *supra* note 28, at 307 (detailing the steps in this timeline).

44. Christina Voigt, *On the Paris Agreement's Imminent Entry Into Force (Part II of II)*, EJIL: TALK! (Oct. 12, 2016), https://www.ejiltalk.org/on-the-paris-agreements-imminent-entering-into-force-what-are-the-consequences-of-the-paris-agreements-entering-into-force-part-ii/.

45. *Id.*

46. *Id.*

47. *See, e.g.*, Christoff, *supra* note 19, at 778; Falkner, *supra* note 12, at 1121–22; Frederic Gilles Sourgens, *Climate Commons Law: The Transformative Force of the Paris Agreement,* 50 N.Y.U. J. INT'L L. & POL. 885, 900 (2018) ("The Paris Agreement sought to engender global action by mutual reliance.").

undertake progressively deeper cuts themselves.[48] In this view, the five-year "stocktake" review conferences—a collective "show and tell" on the international stage[49]—will be the key fora for exercising peer pressure under the Agreement.

I refer to these arguments about disclosure, reciprocity, and reputation as the "peer pressure proposition." The peer pressure proposition holds that positive peer pressure or perceived reputational costs will encourage parties to make and achieve progressively more ambitious commitments under the Agreement.[50]

There is reason to question whether the peer pressure proposition can *consistently* work to support the Paris Agreement over several decades, especially through global political and economic upheavals. The peer pressure proposition needs to be critically scrutinized, rather than merely assumed.

Below, I challenge some key assumptions of the peer pressure proposition, arguing that skepticism is warranted for three main reasons: states will prioritize domestic interests over international reputation, "naming and shaming" strategies are not likely to be effective, and it is not assured that states will find it easier to make deep emissions cuts in the near future.

1. Domestic interests will likely outweigh perceived international reputational concerns.

One reason for skepticism is that the peer pressure proposition excessively emphasizes the role of international reputation. Reputation surely matters in

48. *See* Joseph E. Aldy et al., *Economic Tools to Promote Transparency and Comparability in the Paris Agreement*, 6 NATURE CLIMATE CHANGE 1000, 1002 (2016) ("The long-term success of the Paris Agreement is likely to depend on assessments of whether comparable countries undertake comparable mitigation efforts."); *see also* Jennifer Jacquet & Dale Jamieson, *Soft but Significant Power in the Paris Agreement,* 6 NATURE CLIMATE CHANGE 643, 646 (2016).

49. Louisa Casson, *Vive le Ratchet!*, E3G (Dec. 7, 2015), https://www.e3g.org/library/vive-le-ratchet. *See* Meinhard Doelle, *The Paris Agreement: Historic Breakthrough or High Stakes Experiment?*, 6 CLIMATE L. 14, 28 (2016) ("There is every reason to expect that each five-year stocktaking and review cycle will pressure parties to increase their ambition toward a collective effort sufficient to meet the long-term goals set out in the Paris Agreement."); *see also* Wolfgang Obergassel et al., *Phoenix from the Ashes—An Analysis of the Paris Agreement to the United Nations Framework Convention on Climate Change*, WUPPERTAL INST. FOR CLIMATE, ENV'T & ENERGY 45 (2016) (noting that the stocktakes will "force countries to justify the ambition level of their contributions").

50. While the peer pressure proposition is usually framed in terms of peer pressure from other states, some scholars also include pressure from NGOs as part of the constellation of reputational pressures. *See, e.g.*, Sylvia I. Karlsson-Vinkhuyzen et al., *Entry into Force and Then? The Paris Agreement and State Accountability*, 18 CLIMATE POL'Y 593 (July 31, 2017) (describing several "pathways" for holding states accountable to Paris Agreement commitments, including pressure from other states, pressure from domestic institutions, and pressure from public and community groups such as NGOs); Sylvia Karlsson-Vinkhuyzen & Harro van Asselt, *Strengthening Accountability Under the 2015 Climate Change Agreement*, CLIMATE STRATEGIES (Nov. 2, 2015), https://climatestrategies.org/wp-content/uploads/2015/11/CS-PB2-Strengthening-Accountability-final2.pdf. It is appropriate to consider the role of NGOs because they have been active in tracking progress, compiling data, and calling out flawed policies. Even when both governmental and nongovernmental entities are considered, however, the question remains the same: Will informal pressure be sufficient to keep parties moving along the ratchet mechanism?

international law. As Ian Johnstone has argued, "states care about collective judgment of their conduct because they have an interest in reciprocal compliance by and future cooperation with others . . . ."[51]

International reputation is but one consideration for states, however. A more nuanced account would acknowledge that states make a cost-benefit calculus on the stringency of their international climate commitments, and their calculus gives substantial weight to domestic interests. These domestic interests include the immediate pressures of electoral politics, the expected impact of deep emissions cuts on domestic industries, and prioritization of national economic growth over global emissions reductions.

In each party's cost-benefit calculus, powerful domestic economic interests will undoubtedly weigh as much or more than concerns about international reputation, particularly because any reputational "hit" under the Agreement is tied to a *nonbinding* climate pledge. NDCs are legally unenforceable pledges, so the reputation costs of failing to achieve them are diluted.[52]

Even if many governments were to perceive that net benefits outweigh net costs in committing to ambitious NDCs, the *distribution* of costs on powerful domestic actors might act as a drag on national ambition. For example, if veto players in the oil, coal, or palm oil industries retain their political influence with the governments of major emitters (for example, Russia, Saudi Arabia, South Africa, Indonesia), which seems likely, these governments might perceive international pressure to submit more ambitious NDCs, combined with intense domestic pressure to do less. As a consequence, these important states might continue to submit weak NDCs throughout the 2020s. Russia is emblematic of this group. It is the fourth largest GHG emitter, yet it held off on ratifying the Paris Agreement until 2019, and its NDC is so weak that Russia is already achieving its 2030 target.[53]

The cost of making deep emissions cuts will be a driving factor as states consider second- and third-round NDCs in the 2020s. For the United States, cost estimates are in the trillions of dollars for staying on an emissions trajectory through midcentury that is consistent with the Agreement's two-degree temperature goal.[54] To be sure, there are also massive, incalculable benefits to

51. Ian Johnstone, *The Power of Interpretive Communities*, *in* POWER IN GLOBAL GOVERNANCE 187 (Michael Barnett & Raymond Duvall eds., 2005).

52. Parties may be particularly prone to ignore these reputational costs if the NDC itself was submitted by a prior president, prime minister, or regime. It is also likely that prolonged recessions would diminish a government's enthusiasm to implement nonbinding promises that were made during periods of strong economic growth.

53. Alec Luhn, *Russia Ratifies Paris Climate Accord – But Targets are 'Critically Insufficient'*, THE TELEGRAPH (Sept. 29, 2019), https://www.telegraph.co.uk/news/2019/09/23/russia-ratifies-paris-climate-accord-targets-critically-insufficient/.

54. *See, e.g.*, Geoffrey Heal, *Reflections: What Would it Take to Reduce U.S. Greenhouse Gas Emissions 80 Percent by 2050?*, 11 REV. ENV'T ECON. & POL'Y 319 (2017) (examining both the expected capital costs to deploy renewable energy and the lower operating costs from reduced fossil fuel consumption and calculating net costs of emissions reductions through 2050 as $1.28–3.97 trillion).

preventing runaway warming beyond two degrees.[55] But for any government, it will be the direct near-term costs that will receive the most attention. Given the costs of emissions abatement, there is nothing to stop a country from submitting an unambitious NDC—one that it can easily meet—and saying to the world: "this is all we can do."

An upward spiral of increasing ambition is still possible, of course, if backsliding occurs among smaller players that are negligible contributors to overall global emissions. The Agreement will rise or fall on whether the twenty or so major emitters commit to, and achieve, long-term emissions reductions.[56] But even the major emitters may not be motivated by concerns about international reputation, particularly after President Trump's withdrawal from the treaty. The ratchet mechanism could easily stall.

The best argument that the peer pressure proposition will sustain the Paris Agreement is that norms of reciprocity have already supported concerted action in the past, at the Paris conference itself.[57] After all, no country was obligated to submit any GHG reduction commitment at Paris because no country was obligated to participate. Yet over 180 nations did participate and submit pledges, bringing together a coalition that included the United States, all the other major GHG emitters, and small nations such as Gabon and Micronesia, which are minuscule contributors to the global problem.[58] This initial, baseline level of cooperation, many analysts hope, can eventually be scaled up in a process of mutual reliance, supported by rigorous reporting and verification measures.[59]

There is reason to doubt, however, that the hotter future will look like the cooperative past. While states did make voluntary pledges at Paris, their willingness to do so actually tells us very little about their incentives to make

55. Moody's analytics estimated, for example, that two degrees of warming would reduce U.S. GDP by about 1.2 percent annually by 2100, and that the total cumulative costs to the world of two degrees of warming would be $69 trillion by 2100. *See The Economic Implications of Climate Change,* MOODY'S ANALYTICS (June 2019), https://www.moodysanalytics.com/-/media/article/2019/economic-implications-of-climate-change.pdf.

56. *See* Young, *supra* note 13, at 124 ("[c]ertainly, a coalition encompassing China, the European Union, India, and the United States could put the international community on a path toward solving the problem of climate change").

57. *See* Jennifer Devlin Calkins, *Paris When It Sizzles: What Agenda 21 Can Tell Us About the Likely Success of the Paris Agreement*, 27 WASH. INT'L L. J. 523, 564 (2018); *see, e.g.*, Sourgens, *supra* note 47, at 913 (arguing that parties were willing to make commitments at Paris because they were "second movers" in the position of seeing the pledges of others before becoming irrevocably committed to their own pledge).

58. *See* NDC Registry, *supra* note 23.

59. *See, e.g.*, Aslak Brun, *Conference Diplomacy: The Making of the Paris Agreement*, 4 POL. & GOVERNANCE 115, 120 (2016); Maximilian Högl, *Enabling Factors for Cooperation in Climate Negotiations: A Comparative Analysis of Copenhagen 2009 and Paris 2019* 57 (German Development Institute Discussion Paper, Apr. 2018), https://www.die-gdi.de/uploads/media/DP_14.2018.pdf; Christoff, *supra* note 17 (explaining that the Agreement must "ratchet up" collective climate action and that tougher mitigation measures must be "iteratively brought into being"); Annalisa Savaresi, *The Paris Agreement: A New Beginning?*, 34 J. OF ENERGY & NAT. RES. L. 16 (2016) ("the global stock-take ensures the means to ratchet up the level of ambition over time").

progressively more ambitious pledges through the 2020s, when the needed GHG emissions cuts will become steeper and costlier.[60]

At Paris, it was relatively costless to submit the initial round of commitments. Indeed, for many parties the submission of an NDC brought large benefits because it led to international acceptance of the pledge as a valid opening offer. In the 2020s, however, when the trajectory of necessary reductions becomes steeper, each party will face a more difficult calculus regarding the stringency of its emissions cuts. Domestic cost considerations will weigh heavily and will act as a drag on ambition even in the face of international pressure to "do more."

2. There is a weak record of "naming and shaming" climate change laggards.

A second reason to be skeptical of the peer pressure proposition is that there is a weak historical track record of achieving gains in climate policy by "naming and shaming" states perceived to be climate change laggards.

Canada provides the best example of the challenge of shaming a country into action. Canada withdrew from the Kyoto Protocol in 2011 because it intended to fully exploit its carbon-intensive tar sands in Alberta, and, at the time of its withdrawal, its annual GHG emissions far exceeded its legally binding commitments under the Protocol.[61] Yet Canada suffered few reprisals or consequences for its decision to withdraw from Kyoto. Just a few years later, Canada was welcomed back into the fold in the Paris negotiations, just as the United States would undoubtedly be welcomed back into the Paris framework should a future U.S. president seek to rejoin.

If "naming and shaming" strategies failed to compel adherence to the Kyoto Protocol, which had legally binding targets and timetables, there is little reason to expect that these strategies will now become effective under the Paris Agreement. Because the NDCs are nonbinding, any party who fails to achieve its pledge can respond that the NDC was simply aspirational. Achieving it was never a legal obligation under the treaty.[62]

To put it simply: international acceptance in 2015 of an Agreement that is grounded in voluntary, nonbinding NDCs undercuts the power of "naming and shaming" strategies over the life of the Agreement. The international community has already accepted a climate change regime with aspirational goals, not explicit exchanges of promises. The peer pressure proposition rests on the dubious assumption that states will be sensitive to reputational damage if they fail to

60. CARBON MARKET WATCH, PRICING CARBON TO ACHIEVE THE PARIS GOALS 6 (Sept. 2017), https://carbonmarketwatch.org/wp-content/uploads/2017/09/CMW-PRICING-CARBON-TO-ACHIEVE-THE-PARIS-GOALS_Web_spread_FINAL.pdf.

61. Richard Black, *Canada to Withdraw from Kyoto Protocol*, BBC NEWS (Dec. 13, 2011), https://www.bbc.com/news/world-us-canada-16151310.

62. As Christina Voigt has observed, "compliance in its legal sense is only possible with provisions that set legally binding obligations for parties." Christina Voigt, *The Compliance and Implementation Mechanism of the Paris Agreement*, 25 REV. EUROPEAN CMTY. & INT'L ENVTL. L. 161, 166 (2016).

achieve these goals—goals that *all* parties conceded, from the outset, were nonbinding.

Naming and shaming strategies can work when deployed against a handful of nations who have acted odiously, far outside the bounds of international norms. Human rights violations are the prime example. Indeed, most of the scholarly research on the impact of naming and shaming strategies has been conducted in this area.[63] Most governments are sensitive to their human rights records. Moreover, the norms of proper conduct are long-established, and breaches are considered serious violations of international law.[64] Flouting human rights norms can lead to international outrage, boycotts, and formal and informal pressure on the errant state.[65]

Yet peer pressure—shaming—is likely to be far less effective in the context of climate change.[66] When it comes to fossil fuel consumption, no one has clean hands. There is, as of yet, no clear demarcation line between an acceptable level of consumption of fossil fuels and some unacceptable, reproachable degree of consumption that would trigger international condemnation. The Paris Agreement does not establish any such red line.

3. Emissions cuts will not necessarily become easier in the near future.

The peer pressure proposition may fail to propel ambition for a third reason: One of its core premises, that progress will become easier to achieve over time, is far from a stable, bankable conclusion.

Specifically, many scholars and policymakers have argued that parties will be willing to proceed along the ratchet mechanism with progressively deeper emissions cuts because the commitments themselves will be easier to achieve—

63. *See, e.g.*, J. Franklin, *Shame on You: The Impact of Human Rights Criticism on Political Repression in Latin America*, 52 INT'L STUDIES Q. 187 (2008); E.M. Hafner-Burton, *Sticks and Stones: Naming and Shaming the Human Rights Enforcement Problem*, 62 INT'L ORG. 689 (2008).

64. Franklin, *supra* note 60, at 187; Hafner-Burton, *supra* note 60, at 689.

65. *See generally* The Global Human Rights Regime, COUNCIL ON FOREIGN RELATIONS (May 11, 2012), https://www.cfr.org/report/global-human-rights-regime; Annie Walls, *Data Mining, Lessons from the Kimberley Process for the United Nations Development of Human Rights Norms*, 4 NW J. INT'L HUM. RTS. 388 (2005) (describing the threat of NGO boycotts in spurring adherence to the voluntary Kimberly Process to end human rights abuses in the diamond industry); Barbara A. Frey, *The Legal and Ethical Responsibilities of Transnational Corporations in the Protection of International Human Rights*, 6 MINN. J. GLOBAL TRADE 153, 169 (1997) (describing corporate codes of conduct and actions by corporations to isolate regimes that abuse human rights).

66. In one of the few empirical studies of naming and shaming strategies in the environmental context, Amanda Murdie concluded that naming and shaming strategies are less effective compared to similar strategies in human rights policy. Although her data showed that criticism by environmental groups can lead to reputational damage for states, Murdie concluded the "magnitude of this effect depends on the state's domestic characteristics, ranging from regime type to bureaucratic institutions and the severity of the problem at hand." Amanda Murdie, *Why Pick On Us? Environmental INGOs and State Shaming as a Strategic Substitute*, 63 POL. STUD. 353 (2015). She further concluded that domestic considerations will determine if the state responds to the naming and shaming strategies of environmental groups, concluding that "the cost of abating pollution determines how readily the state responds to naming and shaming." *Id.*

economically, technologically, and politically—over time.[67] For example, new technologies or falling prices for renewable energy could allow nations to promise more in the 2020s than they promised in 2015, facilitating a greater degree of trust and reciprocity among the parties. Following this optimistic narrative, the Paris Agreement, which began as a "shallow" treaty in 2015 with insufficient NDCs, could over time evolve into a "deep" treaty in which parties commit to substantial emissions cuts and implement them domestically.[68]

Brian Deese, President Obama's environmental advisor, articulated this assumption in a 2017 *Foreign Affairs* article about the Agreement's ability to outlast President Trump: "Because the economic forces that gave rise to the agreement have continued to accelerate," Deese argued, "more and more countries now see the benefits of leading in the fast-growing clean energy industries. So they will likely raise their targets to reap the rewards of staying ahead of the pack."[69]

The Obama Administration's official NDC submittal also repeated the assumption that future progress will be easier to achieve, contending that "political will to take ambitious action generally increases over time."[70] The assumption is widely shared among scholars.[71] According to two British scholars, it is a "reasonable assumption" that countries' domestic constraints on raising the ambition of NDCs will gradually fall during the 2020s.[72]

As we enter the 2020s, however, this "reasonable assumption" looks like wishful thinking. In recent years, populist and nationalist movements opposed to climate action have risen to power in key emitting states. The president of the United States is a climate change denier committed to reviving the coal industry and reversing the EPA regulations upon which President Obama's 2015 NDC was based.[73] Given these developments, the Obama Administration's prophecy that "political will to take ambitious action generally increases over time" was badly mistaken.[74]

67. Joseph Allan MacDougald, *Paris, Policy, and the Grid: History and Context*, 33 CONN. J. INT'L L. 409, 421 (2018); Brian Deese, *Paris Isn't Burning*, FOREIGN AFFAIRS (July/Aug. 2017), https://www.foreignaffairs.com/articles/2017-05-22/paris-isnt-burning.

68. *See* Keohane & Victor, *supra* note 20, at 5 (noting that "shallow coordination can create vital conditions for deeper cooperation, such as reliable systems for emissions accounting and reporting").

69. Deese, *supra* note 67. Similarly, lead U.S. negotiator Todd Stern expressed hope that parties could progressively ramp up their NDCs in a virtuous circle of cooperation. He noted, for example, that in 2020, "we think the target [the United States] could put forward for 2030" would be "measurably higher than a 2030 target we could put forward now." Todd D. Stern, *Seizing the Opportunity for Progress on Climate*, YALE SCHOOL OF FORESTRY & ENVTL. STUDIES (Oct. 14, 2014), https://www.youtube.com/watch?time_continue=502&v=sUm2VjMmhkg.

70. NDC Registry, *supra* note 23.

71. *See generally* Green, *supra* note 17, at 25.

72. *Id.*

73. *How the Trump Administration is Rolling Back Plans for Clean Power*, THE GUARDIAN (Aug. 21, 2018), https://www.theguardian.com/environment/2018/aug/21/epa-clean-power-plan-rollback-affordable-energy-rule; Sourgens, *supra* note 47, at 930–31 (noting the centrality of EPA's Clean Power Plan to achievement of the U.S. NDC).

74. NDC Registry, *supra* note 23.

Economic and technological changes do not automatically favor greater commitments by Paris parties in the 2020s. They may, or they may not. It depends on politics, the speed of technology uptake, and in the case of developing countries, whether outside financing is available to speed the rate of adoption.

Consider some facts on the ground. It is true the price of renewable energy has fallen dramatically, facilitating rapid deployment of carbon-free energy sources in the 2020s.[75] But it is also true that 1,200 new coal-fired power plants are under construction worldwide.[76] In fact, global consumption of coal *increased* between 2015 and 2018.[77] This continued build-out of fossil fuel infrastructure will, in the 2020s and beyond, sustain powerful incumbent industries that will oppose climate action and lobby their governments against it.[78] This industry opposition could result in a drag on the ambition of coal-dependent states such as India, China, and South Africa.

Even if low-carbon technology were deployed rapidly in sectors such as electric utilities, buildings, and transportation, the rate of technological progress will not likely be fast enough for the world to stay on an emissions path consistent with the Agreement's two-degree goal. The problem is that growth in global GDP and global population will likely swamp any reduction in carbon intensity per unit of GDP that stems from technology improvements.[79] The result will be an overall rise in global GHG emissions for at least the next decade, even as low-carbon technologies proliferate. Indeed, the International Energy Agency predicts that global energy demand will increase by 25 percent by 2040, that demand will principally be met by fossil fuels, and that global GHG emissions

75. Megan Mahajan, *Plunging Prices Mean Building New Renewable Energy is Cheaper Than Running Existing Coal*, FORBES (Dec. 3, 2018), https://www.forbes.com/sites/energyinnovation/2018/12/03/plunging-prices-mean-building-new-renewable-energy-is-cheaper-than-running-existing-coal/#2edc017231f3; Jeremy Berke, *One Simple Chart Shows Why an Energy Revolution is Coming—And Who is Likely to Come Out on Top*, BUS. INSIDER (May 8, 2018), https://www.businessinsider.com/solar-power-cost-decrease-2018-5.

76. Somini Sengupta, *The World Needs to Quit Coal, So Why Is It So Hard?*, N.Y. TIMES (Nov. 24, 2018), https://www.nytimes.com/2018/11/24/climate/coal-global-warming.html.

77. *Id.*

78. *Id.*

79. In a 2018 working paper, two economists modeled what level of per capita GDP growth through 2050 would be consistent with having a reasonable chance (66 percent) of staying within the two-degree window, assuming dramatic, unprecedented improvements in the carbon intensity of world economies. E. Schroder & S. Storm, *Economic Growth and Carbon Emissions: The Road to Hothouse Earth is Paved with Good Intentions* (Institute for New Economic Thinking Working Paper, 2018). Their research question, in other words, was if nations could somehow "decouple" their growth from GHG emissions, finding technological solutions to improve standards of living with far less fossil fuel consumption, how much could per capita income increase annually through 2050 and still have a reasonable chance of avoiding warming beyond 2 degrees Celsius? Their answer: a 0.45 percent annual growth rate in GDP per capita, about one-fifth of historic growth rates. The finding shows we are highly carbon constrained. The paper explains that annual growth in per capita GDP must somehow slow to near-zero to avoid catastrophic warming. *Id.*

will also rise through 2040.[80] Deforestation, a major source of emissions, is ultimately driven by population growth and increasing affluence.[81] That problem will become *more* difficult to solve as time passes.[82]

In sum, the assumption that it will become easier over time for Paris Agreement parties to pledge aggressive cuts is central to the expected operation of the ratchet mechanism. It is central to the peer pressure proposition. It may hold for some countries and for some technologies over the span of many decades. But the assumption does not hold as a near-term bankable proposition for the world.

C. Starting Small and Building Ambition over Time: The Historical Record

In pointing out the many ways in which the assumptions behind the ratchet mechanism and the peer pressure proposition are problematic, I do not mean to suggest that the Paris Agreement will inevitably collapse, but simply that it is fragile. In Part II, I detail some of the stressors on the Agreement that have emerged since it was signed.

Before turning to Part II, however, it is important to examine some historical parallels to the Agreement. There are many examples of Multilateral Environmental Agreements (MEAs) that start as "modest arrangements" that make few initial demands on the parties and then strengthen over time as trust among the parties builds and as science develops.[83] These MEAs had an outsized influence on the Paris negotiators, shaping their perceptions and expectations of how the Agreement would strengthen over time. Scholars have regularly pointed to these precedents as reason for optimism that Paris can evolve into a "deep" and effective treaty over time.[84]

The MEAs governing ozone depletion provide a notable example. The ozone treaty regime began with the 1985 Vienna Convention for the Protection of the Ozone Layer,[85] a framework convention that demanded no cuts in ozone-depleting substances.[86] It simply established reporting requirements and facilitated further research.[87] The Vienna Convention was followed two years later by the Montreal Protocol, which did contain binding reductions in each

80. Int'l Energy Agency, *World Energy Outlook 2018 Executive Summary* (2018), https://webstore.iea.org/download/summary/190?fileName=English-WEO-2018-ES.pdf (figures are for a scenario that includes countries' announced new energy and climate policies).

81. Calum Brown et al., *Achievement of Paris Climate Goals Unlikely Due to Time Lag in the Land System*, 9 NATURE CLIMATE CHANGE 203 (2019).

82. *See id.* (noting that between 2015 and 2016, deforestation increased by 29 percent in Brazil and 44 percent in Columbia and explaining that rates of primary forest loss in the Congo and Indonesia are now 1.5 and 3 times, respectively, the rate of Brazil).

83. Young, *supra* note 13, at 125.

84. *Id.* at 129.

85. Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, 26 I.L.M. 1516.

86. *Id.*

87. *Id*. at arts. 3–5.

nation's consumption of ozone-depleting substances.[88] The Montreal Protocol parties then negotiated a series of amendments in the 1990s that tightened phase-out deadlines and added new substances to the list of those controlled.[89]

An upward ratchet mechanism worked in the ozone regime because governments calculated that the cost of inaction was severe as new science highlighted the health effects of ozone layer damage.[90] Only a handful of developed nations were major producers of ozone-depleting substances, reducing the level of complexity in negotiations.[91] Above all, the ozone regime strengthened over time because major manufacturers like DuPont were able to develop substitute chemicals that achieved the same functions as the ozone-depleting substances.[92] These substitutes made it easier for parties to commit to rapid phase-outs of ozone-depleting substances.

The 2001 Stockholm Convention on Persistent Organic Pollutants provides another example of how MEAs can be strengthened over time. That treaty banned production of an initial list of a "dirty dozen" toxic chemicals and also contained a mechanism for parties to add to the initial list over time.[93] Because most of the Stockholm parties had already banned the "dirty dozen" chemicals under domestic law, the initial treaty commitments were relatively easy for parties to undertake.[94] The treaty simply codified internationally what the parties had already accomplished domestically. Eight years after adopting the initial text, the parties took the next step in 2009 by expanding the treaty to cover sixteen additional substances beyond the "dirty dozen."[95]

The success of the ozone regime and the Stockholm Convention shows the possibility of deep behavioral change by states after an initial period of cooperation. In the end, however, these MEAs offer only limited guidance for the Paris Agreement. The treaties were issue-specific and focused on a narrower set of problems than the Agreement. They involved fewer players, and substitutes were available for the problematic substances regulated under the treaties.

88. Montreal Protocol on Substances that Deplete the Ozone Layer, Sep. 16, 1987, 1522 U.N.T.S. 3.

89. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, June 29, 1990, 1598 U.N.T.S. 469.

90. DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 604 (4TH ED. 2011); Peter M. Morrisette, *The Evolution of Policy Responses to Stratospheric Ozone Depletion*, 29 NAT. RESOURCES J. 793, 794 (1989)*;* F. Sherwood Rowland, *Atmospheric Changes Caused by Human Activities: From Science to Regulation*, 27 ECOLOGY L.Q. 1261, 1274 (2001).

91. Ian Rae & Annie Gabriel, *Saving the Ozone Layer: Why the Montreal Protocol Worked,* THE CONVERSATION (Sept. 9, 2012), http://theconversation.com/saving-the-ozone-layer-why-the-montreal-protocol-worked-9249; HUNTER ET AL., *supra* note 90, at 546 (noting that production was concentrated in the United States and Europe and dominated by just a few multinational companies such as Dupont and ICI).

92. HUNTER ET AL., *supra* note 90, at 582.

93. Stockholm Convention on Persistent Organic Pollutants, May 22, 2001, 2256 U.N.T.S. 119.

94. Andrew J. Yoder, *Lessons from Stockholm: Evaluating the Global Convention on Persistent Organic Pollutants*, 10 IND. J. GLOBAL LEGAL STUD. 113, 122–23 (2003).

95. Stockholm Convention on Persistent Organic Pollutants, *supra* note 93.

Climate change is a far more fiendish problem. There are billions of sources of GHG emissions.[96] Every nation on earth uses the fuels that lead to climate disruption, and the existing infrastructure for fossil fuels is locked in for decades.[97] Although there are carbon-free energy substitutes, the transition cannot be made easily.[98]

There are counterexamples in international law, moreover, that should give us pause. These examples suggest that if parties are not on track to fulfill even their *initial* commitments under the Agreement, there will be little momentum to strengthen those commitments over time. In the past half century, dozens of MEAs were launched with unambitious, largely voluntary commitments by parties, and those MEAs remain just as "shallow," unambitious, and ineffective today.

One such example is the 1971 Ramsar Convention on Conservation of Wetlands.[99] Relying on nonbinding, voluntary commitments, the Ramsar Convention involved minimal obligations and exhorted parties to take a national wetlands inventory and report results to the secretariat.[100] The principal obligation in the Convention was that each party was required to designate a wetland within its borders deemed worthy of international recognition and nominate that wetland to an international list.[101] The treaty itself did not require any party to conserve or expand any wetlands within its territory, including the wetland(s) that it nominated for the international list.

Over fifty years, compliance with the Ramsar Convention has been high, but the treaty has been ineffective at conserving wetlands. Most parties followed the treaty's requirements to the minimal possible extent: they designated a single wetland for international listing.[102] The treaty never expanded beyond its original dictates, and the impact of the Ramsar Convention on national wetland protection policies has been negligible.[103]

96. Even looking at just one small fraction of the problem—passenger vehicles—there are over a billion sources of emissions on the planet. John Voelcker, *1.2 Billion Vehicles on World's Roads Now, 2 Billion by 2035: Report*, GREEN CAR REPORTS (July 29, 2014), https://www.greencarreports.com/news/1093560_1-2-billion-vehicles-on-worlds-roads-now-2-billion-by-2035-report.

97. Emily Hammond & Jim Rossi, *Stranded Costs and Grid Decarbonization*, 82 BROOK. L. REV. 645, 645–46 (2017).

98. Alice Kaswan, *Energy, Governance, and Market Mechanisms*, 72 U. MIAMI L. REV. 476, 578 (2018); Hammond & Rossi, *supra* note 97, at 645–46.

99. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Feb. 2, 1971, 996 U.N.T.S. 14583.

100. *Id.* at art. 6(2)(e).

101. *Id.* at art. 2.

102. Kim Diana Connolly, *Multipolar Governance Across Environmental Treaty Regimes: The Ramsar Convention in its Middle Age*, 107 PROCEEDINGS OF THE ASIL ANN. MEETING 440, 442 (2014).

103. *See, e.g.,* Ilse R. Geijzendorffer et al., *A More Effective Ramsar Convention for the Conservation of Mediterranean Wetlands*, 7 FRONTIERS IN ECOLOGY & EVOLUTION 1 (2019); Nick C. Davidson, *How Much Wetland Has the World Lost? Long-Term and Recent Trends in Global Wetland Area*, 65 MARINE & FRESHWATER RES. 934, 940 (2014); C. M. Finlayson et al., *The Second Warning to Humanity — Providing a Context for Wetland Management and Policy*, 39 WETLANDS 1, 2 (2019).

In the climate change regime, the 1997 Kyoto Protocol[104] is the most relevant counterexample that serves as a cautionary precedent for the Paris Agreement. Like the Paris Agreement, the Kyoto Protocol had near-universal ratification.[105] It contained a form of ratchet mechanism (though that term was not used then) because the parties envisioned a series of "commitment periods" extending over decades, with the first commitment period ending in 2012. The 43 developed country parties, listed in Annex B of the Protocol, were legally required to achieve their GHG-reduction targets by the end of the first commitment period, with an expectation that they would then negotiate progressively deeper GHG reductions for each subsequent commitment period.[106]

This anticipated upward spiral never occurred. Some developed countries, such as Japan, Australia, and New Zealand, failed to achieve their Kyoto targets by the end of the first commitment period.[107] Canada withdrew from the treaty in 2011.[108] The United States never ratified it.[109] Today the Kyoto Protocol is still in force, but it has collapsed into irrelevancy.[110]

One reason for the collapse of Kyoto is that geopolitics changed dramatically between 1997, when the treaty was adopted, and 2009, when the parties began to negotiate the terms of a second commitment period. In that period of just over a decade, annual Chinese GHG emissions tripled, George W. Bush defeated Al Gore in the 2000 election, the Bush Administration announced it would never join the treaty (putting the United States in the position of free riding on international efforts), and the world suffered under a major global

104. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 11, 1997, 2303 U.N.T.S. 30822.

105. The Protocol has been ratified by 192 parties. *See* United Nations, *The Kyoto Protocol, Status of Ratification,* https://unfccc.int/process/the-kyoto-protocol/status-of-ratification.

106. *See generally* Sheila M. Olmstead & Robert N. Stavins, *A Meaningful Second Commitment Period for the Kyoto Protocol*, ECONOMISTS' VOICE (2007) (outlining changes to the Kyoto Protocol for the second commitment period to attract widespread participation); European Commission Press Release MEMO/13/956, The Commission, Questions & Answers on EU Ratification of the Second Commitment Period of the Kyoto Protocol (Nov. 6, 2013).

107. Duncan Clark, *Has the Kyoto Protocol Made Any Difference to Carbon Emissions?*, THE GUARDIAN (Nov. 26, 2012), https://www.theguardian.com/environment/blog/2012/nov/26/kyoto-protocol-carbon-emissions (comparing national GHG reduction pledges at Kyoto to results achieved by 2010).

108. Ian Austen, *Canada Announces Exit from Kyoto Climate Treaty*, N.Y. TIMES (Dec. 12, 2011), https://www.nytimes.com/2011/12/13/science/earth/canada-leaving-kyoto-protocol-on-climate-change.html.

109. David Malakoff & Erin Marie Williams, *Q & A: An Examination of the Kyoto Protocol*, NAT'L PUB. RADIO (June 6, 2007), https://www.npr.org/templates/story/story.php?storyId=5042766.

110. The 2012 Doha Amendment established a second commitment period running from 2012–2020. It called for an average of 18 percent reductions in emissions below 1990 levels, compared to an average of 5 percent reductions below 1990 levels in the Kyoto Protocol's first commitment period. Several large emitters, including Russia, Japan, and Canada, announced that they would not ratify the Doha Amendment, and the Doha Amendment has not entered into force. Laurence Boisson de Chazournes, *The Climate Change Regime—Between a Rock and a Hard Place?*, 25 FORDHAM ENVTL. L. REV. 625, 632 (2014).

financial crisis.[111] In that decade, it also became clear that future growth in GHG emissions would come mainly from developing countries (especially China and India), which were unconstrained by the Kyoto Protocol.[112] As a result of these tensions, the Kyoto Protocol descended into Breakdown within just a few years of entering into force in 2005.[113]

The Kyoto Protocol provides a cautionary tale. It demonstrates the substantial challenges of holding a treaty regime together to promote GHG reductions over multidecade timespans.

To be sure, there are fundamental differences between Paris and Kyoto. Paris is in many ways the anti-Kyoto. It was negotiated with voluntary pledges to avoid the deadlocks that plagued Kyoto and to attract the participation of the United States. It implements a "bottom-up" structure of self-defined pledges rather than a "top-down" structure of mandatory targets and timetables.[114]

Because Paris rests so heavily on voluntary action, however, it is important to ask whether the assumptions of the ratchet mechanism and the peer pressure proposition are likely to hold through the next decade. Has geopolitics shifted since 2015 in a way that will undermine the Paris Agreement, just as geopolitics shifted after the adoption of the Kyoto Protocol in 1997? Will the cooperative assumptions of the Paris Agreement hold when climate scientists are urging 5 to 8 percent reductions in global GHG emissions *every year* to avoid warming beyond two degrees Celsius? And what are the prospects for the Paris Agreement if it becomes clear, within the next few years, that the major GHG emitters have little chance of fulfilling even the initial targets contained in their 2015 pledges?

These questions are addressed in the next Part, which focuses on the stressors and tensions that could lead the Paris Agreement toward Breakdown or Breakup.

II. TENSIONS IN THE CLIMATE CHANGE REGIME

Since the Paris Agreement was adopted, several factors have raised the likelihood that it will fall into a downward spiral, rather than the upward spiral envisioned by negotiators. The optimistic view—that states will be motivated by reputational concerns to move along the Paris ratchet and implement deep cuts

111. Yuli Shan et al., *Data Descriptor: China CO2 Emission Accounts 1997-2015*, 5 SCI. DATA 1, 2 (2018); *See* Andrew C. Revkin, *Bush's Shift Could Doom Air Pact, Some Say*, N.Y. TIMES (Mar. 17, 2001), https://www.nytimes.com/2001/03/17/us/bush-s-shift-could-doom-air-pact-some-say.html.

112. Lauren E. Schmidt & Geoffrey M. Williamson, *Recent Developments in Climate Change Law*, 37 COLO. LAW. 63, 64 (2008); David Shorr, *Think Again: Climate Treaties*, FOREIGN POL'Y (Mar. 17, 2014), https://foreignpolicy.com/2014/03/17/think-again-climate-treaties/.

113. *See* Robert Falkner, *The Unavoidability of Justice – and Order – in International Climate Politics: From Kyoto to Paris and Beyond*, 21 BRITISH J. OF POL. AND INT'L REL. 270, 272–73 (2019) (explaining that the dramatic rise in developing country emissions put a strain on the Kyoto Protocol and arguing that the "binary logic of Kyoto's burden-sharing arrangement seemed increasingly out of touch with global economic reality").

114. DANIEL BODANSKY & ELLIOT DIRINGER, BUILDING FLEXIBILITY AND AMBITION INTO A 2015 CLIMATE AGREEMENT 1 (Ctr. For Climate & Energy Solutions 2014).

in emissions—will be severely tested in the 2020s. The U.S. withdrawal and abdication of leadership could be replicated by other major emitters, and states may balk at the deep cuts necessary to stay within the two-degree window. Content to make symbolic gestures, parties might adhere to the contours of the Agreement while engaging in practices and policies that lead the world to catastrophic warming beyond three degrees Celsius.

The tensions in the climate change regime, which I document in this Part, have little to do with the text of the Agreement. No alternative text or language could avoid these conflicts. The Agreement was probably the best text that could have been negotiated at the time given the constellation of state interests, the prior failure of Kyoto-style mandates, and the need to avoid binding obligations that would have triggered the need for U.S. Senate ratification.

As we enter the 2020s, however, there are four major tensions that are destabilizing the Agreement and making it vulnerable to a downward spiral: 1) the impact of the U.S. withdrawal; 2) parties' lack of progress toward their own voluntary NDCs; 3) political tensions emerging in reaction to scientific reports about the scale of necessary emissions reductions; and 4) conflicts among the parties over insufficient climate change finance.

A. The Impact of the U.S. Withdrawal

President Trump's 2017 withdrawal announcement, followed by the formal submittal of the U.S. withdrawal in 2019, were major setbacks that make a downward spiral in the Paris Agreement far more likely. His actions spoiled the universality that had been one of the Agreement's major achievements.[115] They also undermined one of the core planks of the peer pressure proposition: that the major emitters will be role models for the rest of the world.

As the largest cumulative GHG emitter since the Industrial Revolution,[116] the United States bears the largest share of responsibility for the climate crisis. Its withdrawal from the Agreement, coupled with President Trump's rollback of Obama Administration climate policies,[117] casts a long-term shadow over the Agreement and very likely makes it impossible for the remaining parties to limit warming to two degrees Celsius.[118] Rising U.S. GHG emissions, which have surged since 2017, means that other states will have to make even deeper cuts in

115. Zhang Hai-Bin et al., *U.S. Withdrawal from the Paris Agreement: Reasons, Impacts, and China's Response*, 8 ADVANCES IN CLIMATE CHANGE RES., 220, 222 (2017).

116. Mengpin Ge et al., *6 Graphs Explain the World's Top 10 Emitters*, WORLD RESOURCES INST. (Nov. 25, 2014), https://www.wri.org/blog/2014/11/6-graphs-explain-world-s-top-10-emitters.

117. Nadja Popovich et al., *85 Environmental Rules Being Rolled Back Under Trump*, N.Y. TIMES, (Sept. 12, 2019), https://www.nytimes.com/interactive/2019/climate/trump-environment-rollbacks.html.

118. *See* Guri Bang et al., *The Paris Agreement: Short-Term and Long-Term Effectiveness*, 4 POL. & GOVERNANCE 209, 214 (2016) (noting that "for any comprehensive international climate agreement to work, it is vital that the world's most powerful country shows interest in participation and compliance with its pledges"). U.S. emissions rose after President Trump's announcement, surging 3.4 percent in 2018 alone. Brad Plumer, *U.S. Carbon Emissions Surged in 2018 Even As Coal Plants Closed*, N.Y. TIMES (Jan. 8, 2019), https://www.nytimes.com/2019/01/08/climate/greenhouse-gas-emissions-increase.html.

emissions to achieve the Paris targets.[119] The United States has thrown the burden of emissions reductions on others and has made withdrawal a realistic option for other parties to the Agreement.

Most commentators take a rosier view, suggesting that the reversals under the Trump Administration will not affect the long-term prospects of the Agreement.[120] Early in the Trump presidency, scholars stressed that because the U.S. withdrawal cannot formally take effect until November 2020,[121] President Trump's 2017 speech in the Rose Garden had no real consequences. Harold Koh, for example, argued that "Trump's withdrawal announcement has no more legal meaning than one of his tweets."[122] In Europe, scholars have argued that the U.S. withdrawal is a blessing. The title of one prominent article was "Better Out than In."[123] According to some European scholars, the U.S. exit will liberate the remaining parties to strengthen the Agreement without the United States acting as a drag on aspirations.[124] Many scholars have taken solace in the fact that U.S. states, cities, and businesses have committed to emissions reductions to help sustain the Agreement in the absence of U.S. participation.[125]

A more realistic appraisal, however, must acknowledge the gravity of President Trump's actions. For the United States to abandon the Paris process while the process is still in its infancy sends deeply distressing signals to the international community.

The withdrawal is particularly offensive because the Agreement had been crafted to satisfy U.S. concerns. U.S. domestic politics shaped the zone in which agreement could be reached at Paris, and the text of the Agreement was

119. Zhang et al., *supra* note 115, at 222 (explaining that the withdrawal has the effect of "squeezing other countries' emission space and raising their mitigation costs, and this will in turn make it more difficult and expensive to achieve the 2°C target of the Paris Agreement").

120. *See, e.g.*, Nadja Popovich & Tatiana Schlossberg, *How Cities and States Reacted to Trump's Decision to Exit the Paris Climate Deal*, N.Y. TIMES (June 2, 2017), https://www.nytimes.com/interactive/2017/06/02/climate/trump-paris-mayors.html (describing the commitments of many U.S. mayors and governors to follow the Paris Agreement); David Choi, *How World Leaders are Reacting to Trump's Decision to Leave the Paris Climate Agreement*, BUS. INSIDER (June 1, 2017), https://www.businessinsider.com/paris-climate-agreement-reaction-from-world-leaders-2017-6 (describing the reactions of foreign leaders).

121. *See* Paris Agreement, *supra* note 1, at art. 28 (noting that "[a]t any time after three years from the date on which this Agreement has entered into force for a Party, that Party may withdraw").

122. Harold Hongju Koh, *The Trump Administration and International Law*, 56 WASHBURN L.J. 413, 436 (2017).

123. Lucas Kemp, *Better Out than In*, 7 NATURE CLIMATE CHANGE 458, 458 (2017).

124. *Id.* at 459.

125. *See, e.g.*, Sharmila L. Murthy, *States and Cities as "Norm Sustainers": A Role for Subnational Actors in the Paris Agreement on Climate Change,* 37 VA. ENVTL. L.J. 1, 17–18 (2019) (explaining the role of U.S. states and cities in signaling to other nations that a large portion of the United States remains committed the Paris Agreement). After President Trump's announcement, former Vice President Al Gore and Michael Bloomberg founded an organization called "America's Pledge" through which nine states, almost 230 U.S. cities and counties, and more than 1,500 businesses have committed to work toward the U.S. NDC even in the face of federal inaction. Adela Suliman, *U.S. States, Businesses Will Step Up to Meet Paris Climate Pledge*, REUTERS (August 11, 2017), http://news.trust.org/item/20170811103740-005qk/.

extensively modified to satisfy the United States.[126] Parties made NDCs non-binding, for example, and the Agreement omits strong provisions on climate finance and on liability for climate change damages because of U.S. pressure.[127] President Obama publicly acknowledged that U.S. participation had induced other countries to join the process.[128] The U.S. withdrawal is therefore a "betrayal" to the parties who made those concessions.[129]

Worse yet, the Trump Administration is playing a spoiler role in the remaining years before the withdrawal takes effect. At a meeting of the parties in Poland in 2018, the United States joined with Russia, Saudi Arabia, and Kuwait to block a consensus motion on officially "welcoming" the findings of the IPCC's report on the impacts of 1.5 degrees of warming.[130] This unusual action raised fears that the Trump Administration would not simply sideline the Agreement, but would actively seek to undermine it.[131] The United States also dissented from the final communiqués at G-20 meetings in 2018 and 2019, objecting to consensus language related to climate change.[132] G-20 leaders remain committed to the Agreement in the face of these theatrics,[133] but for how long will they put up with the U.S. absence? And how will they trust that any future U.S. climate commitments will last beyond the next election cycle?

The full impact of the U.S. withdrawal depends a great deal on the 2020 U.S. elections.

The best-case scenario is that the United States rejoins the Agreement in 2021 and that a new president revives the executive actions that were launched

126. *See* Noah Feldman, *The Paris Accord and the Reality of Presidential Power*, BLOOMBERG (June 2, 2017), https://www.bloomberg.com/view/articles/2017-06-02/trump-paris-climate-change-and-constitutional-realities.

127. Elizabeth Burleson, *Climate-Energy Sinks and Sources: Paris Agreement and Dynamic Federalism*, FORDHAM ENVTL. L. REV. 1, 17 (2016); Patpicha Tanakasempipat, *Developed Nations Not Committed to $100 Billion Climate Finance: Experts*, REUTERS (Sept. 5, 2018), https://www.reuters.com/article/us-climatechange-accord/developed-nations-not-committed-to-100-billion-climate-finance-experts-idUSKCN1LL1CX.

128. Remarks on the Paris Agreement on Climate Change, 2016 DAILY COMP. PRES. DOC. 666 (Oct. 5, 2016) ("We continued to lead by example with our historic joint announcement with China two years ago, where we put forward even more ambitious climate targets. And that achievement encouraged dozens of other countries to set more ambitious climate targets of their own. And that, in turn, paved the way for our success in Paris.").

129. Jen Iris Allan, *Dangerous Incrementalism of the Paris Agreement*, 19 GLOBAL ENVTL. POL. 4, 9 (2019).

130. Jonathan Watts & Ben Doherty, *US and Russia Ally with Saudi Arabia to Water Down Climate Pledge*, THE GUARDIAN (Dec. 9, 2018), https://www.theguardian.com/environment/2018/dec/09/us-russia-ally-saudi-arabia-water-down-climate-pledges-un.

131. *Id.*

132. Simon Denyer & Brady Dennis, *As G-20 Reaffirms Fight Against Climate Change, Trump Again Stands Apart*, WASH. POST (June 29, 2019), https://www.washingtonpost.com/climate-environment/as-g-20-reaffirms-fight-against-climate-change-trump-again-stands-apart/2019/06/29/d3d96f22-9a68-11e9-830a-21b9b36b64ad_story.html?utm_term=.6417d29387fb.

133. Andrew Woodcock, *World Leaders Push Back on Pressure from Trump to Water Down G20 Climate Change Commitment*, INDEPENDENT (June 29, 2019), https://www.independent.co.uk/environment/trump-climate-change-g20-world-leaders-japan-paris-agreement-a8980241.html.

under President Obama, such as the Clean Power Plan. Every Democratic candidate has pledged to rejoin the Agreement.[134]

Unfortunately, any new president's legislative agenda on climate change would likely be blocked by Republicans on Capitol Hill. Comprehensive climate change legislation is highly unlikely as long as Republicans hold more than forty seats in the U.S. Senate and can filibuster legislation.[135]

Every indication is that Senate Republicans would block any attempt to enact a "Green New Deal" or similarly ambitious climate legislation.[136] Indeed, President Trump's withdrawal from the Agreement should not be seen as some peculiarity of this president, but rather as a move fully consistent with Republican party orthodoxy and climate change denialism dating back at least twenty years.[137] If a motivated Democratic president takes office, he or she cannot expect cooperation from across the aisle to enact ambitious climate change legislation. Even if the new president quickly rejoins the Agreement, he or she would be limited domestically to working within Executive Branch authority, relying on statutes enacted in the 1970s, just as President Obama was.

Even under this best-case scenario for reengagement with Paris, the United States will likely fall far short of its NDC, which called for a 26 to 28 percent reduction in U.S. emissions below 2005 levels by 2025.[138] The United States is off track to achieve that goal, and it has lost precious time.[139] While the U.S. would undoubtedly be welcomed back by other Paris parties, that embrace would show that there is no long-term penalty for flouting the Agreement.

The worst-case outcome, from the perspective of Breakdown and Breakup scenarios, is that President Trump wins reelection in 2020. That outcome would push any potential U.S. reengagement with the Agreement back to 2025 at the earliest. Such a long-term U.S. absence from the treaty, combined with continued U.S. climate change intransigence, could undercut the willingness of other major emitters such as China, Japan, Australia, India, Brazil, and Indonesia to submit ambitious NDCs in the next decade.[140]

134. *How 18 Democratic Candidates Responded to a Climate Policy Survey*, N.Y. TIMES (Apr. 18, 2019), https://www.nytimes.com/2019/04/18/us/politics/climate-change-2020-democratic-candidates.html.

135. Robinson Meyer, *7 Reasons Democrats Won't Pass a Green New Deal*, THE ATLANTIC (Jan. 29, 2019), https://www.theatlantic.com/science/archive/2019/01/green-new-deal-why-democrats-will-struggle/581245/.

136. *Id.*

137. Scott Waldman & Benajmin Hulac, *This is When the GOP Turned Away from Climate Policy*, E&E NEWS (Dec. 5, 2018), https://www.eenews.net/stories/1060108785/.

138. Brad Plumer & Nadja Popovich, *Here's How Far the World Is From Meeting Its Climate Goals*, N.Y. TIMES (Nov. 6, 2017), https://www.nytimes.com/interactive/2017/11/06/climate/world-emissions-goals-far-off-course.html.

139. *Id.*; John Upton, *America's Climate Plan Falls Short of Its Promises*, CLIMATE CENTRAL (Sept. 26, 2016), http://www.climatecentral.org/news/americas-climate-rules-fall-short-20731; Justin Worland, *U.S. Likely to Fall Short of International Climate Change Commitments, Study Says*, TIME (Sept. 26, 2016), http://time.com/4505906/climate-change-paris-agreement-united-states/.

140. S*ee, e.g.*, Young, *supra* note 13, at 130 ("[c]ertainly, a coalition encompassing China, the European Union, India, and the United States could put the international community on a path toward

Regardless of the outcome of the 2020 election, what has truly been lost under President Trump is not just U.S. participation in the Agreement, but rather U.S. leadership on climate change. As the Trump Administration emphasizes fossil fuel extraction, propping up the coal industry, and offshore drilling, and as President Trump mocks climate science and continues to appoint climate change deniers to key posts, the U.S. government has abdicated any responsibility to reduce emissions.[141] For how long will other nations take costly steps to decarbonize their economies while the United States moves in the opposite direction?

B. Lack of Progress toward NDCs

A second tension that could create a downward spiral for the Paris Agreement is that many states are not on track to achieve their own first-round NDCs, which have 2025 or 2030 target dates. If these NDC shortfalls continue, it will become clear that voluntary action is insufficient to limit global warming. Persistent shortfalls would increase acrimony and undermine confidence in the Agreement.[142] Moreover, they will exacerbate longstanding tensions between developing and developed parties. Developing countries are not likely to escalate the ambition of their pledges if developed countries, with far more resources and a greater historic responsibility for the problem, are falling short on achieving their own first-round pledges.

Evidence of NDC shortfalls is accumulating. According to the latest annual assessment of progress produced by the Dutch Environmental Assessment Agency,[143] only seven of twenty-five parties analyzed are on track, with implemented policies, to achieve their NDCs.[144] For the European Union and for Mexico, the achievement of 2030 targets is uncertain with implemented policies.[145] For another sixteen states, the Agency was confident that the parties would *not* meet their NDCs unless they adopted additional GHG control measures.[146] The Agency appropriately noted that a party being "on track" to

solving the problem of climate change"); Bang et al., *supra* note 118, at 209–10 (noting that a "race to the top" that makes the Paris Agreement "effective in the long term" depends on "whether major emitters prove able and willing to take the lead").

141. Coral Davenport & Lisa Friedman, *How Trump is Ensuring That Greenhouse Gas Emissions Will Rise*, N.Y. TIMES (Nov. 26, 2018), https://www.nytimes.com/2018/11/26/climate/trump-greenhouse-gas-emissions.html.

142. *See, e.g.*, Lucas Kemp, *Better Out than In*, *supra* note 123, at 459.

143. *Two-Thirds of Major Emitting Countries Still Not on Track to Reach Paris Climate Proposals*, NETH. ENVTL. ASSESSMENT AGENCY (Dec. 7, 2018), https://www.pbl.nl/node/65210.

144. These include China, Colombia, India, Russia, Saudi Arabia, Turkey, and Ukraine. *Id.*

145. *Id.*

146. The sixteen countries are Argentina, Australia, Brazil, Canada, Chile, Democratic Republic of the Congo, Ethiopia, Indonesia, Japan, Kazakhstan, Morocco, Republic of Korea, South Africa, Thailand, the Philippines, and the United States. *Id.*

meet its own pledge is not evidence of that party's leadership because the ambition level of the underlying NDCs varies greatly.[147]

The Climate Action Tracker, an online resource produced by a consortium of three international climate consulting firms, shows similar shortfalls in achieving NDCs. While the initial round of 2015-2016 NDCs, assuming full implementation, was expected to lead to warming of 2.5 to 3.8 degrees, the current policy trajectory leads to 2.5 to 4.4 degrees of warming, according to the Climate Action Tracker, because of slow progress toward the NDCs.[148]

The Climate Action Tracker, unlike the Dutch study, grades countries not only on whether they are on track to fulfill commitments, but also on whether the commitments themselves are sufficient to limit warming. It grades ten countries, including Canada, China, and Japan, as offering "highly insufficient" NDCs. It grades five countries, including Russia and the United States, as offering "critically insufficient" NDCs.[149]

Distressingly, the Climate Action Tracker has documented little policy movement since Paris. Its conclusion at the end of 2018 was ominous: "The majority of countries we track have not yet fully aligned their policies to actually achieve their commitments under the Paris Agreement."[150]

Given that major emitting parties are not on track to fulfill their initial NDCs, what are the prospects that states will substantially enhance their NDCs in the 2020s?

More likely, a downward spiral will unfold in the 2020s. The ratchet mechanism will break down. Parties that are failing to achieve their first NDCs, without suffering any reprisals, will be unlikely to submit second-round NDCs that are more ambitious than the first. Bound together in an intractable collective action problem, parties may continue to slow-walk their commitments and pledges in the 2020s, even in the face of increasingly severe climate impacts.

Some scholars have suggested that parties will remain committed to the Agreement even if other parties withdraw or fail to fulfill their pledges.[151] Because NDCs are voluntary and are aligned with domestic priorities, it does not matter to a party's calculus whether *other* countries have fulfilled their NDCs.[152] Regardless of what other countries do, this argument goes, each state will submit an NDC that accords with its evolving conception of its self-interest.[153]

147. *Id.*

148. *Some Progress Since Paris, But Not Enough, as Governments Amble Towards 3ºC of Warming*, CLIMATE ACTION TRACKER (Dec. 11, 2018), https://climateactiontracker.org/publications/warming-projections-global-update-dec-2018/.

149. *Id.*

150. *Id.*

151. *See, e.g.*, Keohane & Oppenheimer, *supra* note 20, at 150.

152. *Id.*

153. Victor, *supra* note 15, at 17 ("most countries are promising and doing what makes sense largely with regard to their own national interest").

I am skeptical that parties will forge ahead in the face of the failures of other parties, especially as climate impacts become more severe. Cooperative environmental regimes can be sustained only if parties perceive that other parties are making appropriate sacrifices.[154] Climate change is, after all, a tragedy of the commons. An effective solution must incentivize parties to go beyond purely self-interested policies for the good of preserving the commons as a whole.[155]

Seen in this light, the expected shortfall on first-round NDCs cannot be dismissed as an unfortunate early stumble. The shortfall in NDCs will matter a great deal politically, economically, and diplomatically in the 2020s, and it could trigger Breakdown or Breakup scenarios.[156] The inability or unwillingness of countries to take actions domestically to achieve their own voluntary pledges will provoke intense arguments over justice and equity—arguments about whether major emitters are doing their "fair share." Widespread NDC shortfalls will also complicate the process of making further rounds of pledges in the 2020s, because, according to the latest science, states will have to increase their pledges dramatically.

C. Conflicts Related to the Scale of Necessary Emissions Reductions

A third tension that threatens to unravel the Paris Agreement in the 2020s is that the scale of necessary emissions reductions has become daunting—and perhaps overwhelming. We are paying a procrastination penalty for past inaction.

The magnitude of necessary reductions will likely create protracted conflicts among the Paris parties. As NDC shortfalls become apparent and as the window for achieving the temperature goals of the Agreement closes, there will likely be intense arguments over which countries need to make more effort. These arguments will destabilize the Agreement because the treaty itself offers no mechanism to allocate effort. It offers no clear path to force a state to do more. Many vulnerable states will likely charge that the major emitters are engaged in unjust, gluttonous consumption, and they will become frustrated with a treaty that cannot constrain emissions growth. After a few years of bitter fights over who needs to "do more"—fights that lead nowhere—parties may question their own adherence to the Agreement.

Consider the emerging science: to limit warming to less than 1.5 degrees Celsius, nations would have to cut their CO_2 emissions (principally from burning oil, coal, and natural gas) by 45 percent from 2010 levels by 2030.[157] According

154. Keohane & Victor, *supra* note 20.

155. Sourgens, *supra* note 47, at 912 ("The core intent behind the Paris Agreement was to escape from a tragedy of the commons.").

156. *Id.* at 914 (discussing the Paris Agreement in terms of a prisoners' dilemma and arguing that if cooperation on GHG reductions is "feigned," all parties would have an incentive to defect from the Agreement, "a result that would be plainly predictable given the incentive structure").

157. IPCC SUMMARY, *supra* note 11. The IPCC specifically notes that global CO_2 emissions would have to decline 45 percent from 2010 levels by 2030 to limit warming to less than 1.5 degrees Celsius.

to the IPCC, staying within the 1.5-degree window requires GHG mitigation costs that are three to four times higher than the costs of staying within the two-degree window.[158]

To limit warming to less than two degrees Celsius, the necessary reductions are less severe, but nonetheless breathtaking. Global GHG emissions would need to peak very soon and then drop continually through 2050.[159] If they peak in 2025, global emissions will need to decline by 5 to 8 percent *annually* through 2050 to stay within the two-degree goal of the Agreement.[160] This is a faster rate of GHG reduction than any nation has ever achieved, yet this rate would have to be sustained globally.[161] Furthermore, it is likely that developing nations would demand that the developed parties commit to even steeper annual reductions, to allow room for emissions growth in the poorest countries in the world.[162]

Parties' pledges to date are nowhere near sufficient to keep the world on this steep downward emissions trajectory. According to the United Nations Environment Programme (UNEP), the emissions reductions anticipated with existing NDCs (about 6 billion tons) need to be roughly tripled to stay on track for a two-degree Celsius scenario and quintupled to limit warming to 1.5 degrees Celsius.[163]

Looking solely at emissions reductions that need to occur in the 2020s, UNEP calculated an "emissions gap" of thirteen to fifteen billion tons of CO_2 equivalent.[164] In other words, in one decade, governments must achieve thirteen to fifteen billion tons of additional GHG emissions reductions *beyond* what they have already pledged in their NDCs. To give some sense of the scale of the emissions gap, consider that the annual emissions from the entire European

Id. Because global emissions are already higher than 2010 levels, the necessary reductions are even steeper than this 45 percent figure.

158. *Id.* at 18.

159. MARIANNE FAY ET AL., DECARBONIZING DEVELOPMENT: THREE STEPS TO A ZERO-CARBON FUTURE 40–41 (World Bank Group 2015), https://openknowledge.worldbank.org/handle/10986/21842 (discussing implications of various peak years for the rate of needed reductions thereafter).

160. *Id.*

161. *Id*. at 40. The fastest rate of GHG emissions reduction by a single country is believed to have occurred in France in the 1970s and 1980s, when France's emissions dropped 2 percent annually due to its embrace of nuclear power. David Biello, *How Nuclear Power Can Stop Global Warming*, SCI. AM. (Dec. 12, 2013), https://www.scientificamerican.com/article/how-nuclear-power-can-stop-global-warming/. The European Union as a whole achieved a 2.2 percent average annual rate of GHG emissions reduction between 2006 and 2016. Brad Plumer & Nadja Popovich, *CO_2 Emissions Were Flat for Three Years. Now They're Rising Again*, N.Y. TIMES (Nov. 13, 2017), https://www.nytimes.com/interactive/2017/11/13/climate/co2-emissions-rising-again.html.

162. *See, e.g.*, Kong Xiangwen et al., *Achieving Accountability in Climate Negotiations: Past Practices and Implications for the Post-2020 Agreement*, 15 CHINESE J. INT'L L. 545 (2015); Shyam Saran, *Paris Climate Talks: Developed Countries Must Do More Than Reduce Emissions*, THE GUARDIAN (Nov. 23, 2015), https://www.theguardian.com/environment/2015/nov/23/paris-climate-talks-developed-countries-must-do-more-than-reduce-emissions.

163. U.N. Environment Programme, *Emissions Gap Report 2018* xv (Nov. 2018).

164. *Id.* at xviii.

transport sector, including aviation, is about one billion tons.[165] The thirteen to fifteen billion-ton emissions gap is massive, and countries must somehow be incentivized to close it.

The challenge of the coming decade is clear, but the Agreement, as noted above, contains no mechanism to allocate effort. The parties will have to fight among themselves, with no clear textual guidance, over who will make the sacrifices to close this emissions gap through their second- and third-round NDCs.

The political implications of the necessary scale of emissions reductions are coming into view. While a gradual glidepath of reductions would have sufficed if governments had started thirty years ago, in the 2020s, aggressive action by governments will be essential. Many have compared it to a war mobilization.[166] The needed actions include imposing substantial energy taxes, ending $550 billion in annual subsidies for fossil fuels, remaking the world's energy systems, and halting deforestation.[167] About one-third of all known reserves of oil and 80 percent of all known reserves of coal will have to remain in the ground to limit global warming to less than two degrees Celsius.[168] Renewable energy will have to be scaled up substantially, from serving 9 percent of global energy demand today to serving 40 percent or more of global energy demand by the end of the decade.[169]

The next decade will be perilous, as intense conflicts will likely arise between the handful of parties that are actually implementing policies consistent with steep emissions reductions, primarily in Europe, and the majority of parties that are making half-hearted efforts.[170] Globally, there are more than 1,200 new coal-fired power plants under construction or in the permitting stage (464 in China alone), and many governments are now locking in a fossil fuel infrastructure that will be emitting carbon through the middle of the century.[171]

165. *See* Press Release, Environment Programme, World must urgently up action to cut a further 25% from predicted 2030 emissions, says UN Environment report, U.N. Press Release (Nov. 3, 2016).

166. LESTER R. BROWN, PLAN B 3.0: MOBILIZING TO SAVE CIVILIZATION 265 (5th ed. 2008); Sarah Wesseler, *Climate Mobilization Plea: Cities Must Declare Emergency*, YALE CLIMATE CONNECTIONS (Sept. 20, 2018), https://www.yaleclimateconnections.org/2018/09/climate-mobilization-plea-cities-must-declare-emergency/.

167. INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2014 (2014).

168. Christophe McGlade & Paul Ekins, *The Geographical Distribution of Fossil Fuels Unused When Limiting Global Warming to 2° C*, 517 NATURE 187, 187 (2015).

169. Robert Rapier, *Renewables Catching Nuclear Power in Global Energy Race*, FORBES (July 7, 2019), https://www.forbes.com/sites/rrapier/2019/07/07/wind-and-solar-power-nearly-matched-nuclear-power-in-2018/#1d60ba39eec3.

170. Finland, for example, recently committed to becoming carbon neutral by 2035. Alessio Perrone, *Finland Vows to Become Carbon Neutral by 2035*, THE INDEPENDENT (June 4, 2019), https://www.independent.co.uk/news/world/europe/finland-carbon-neutral-fossil-fuels-climate-change-global-warming-a8943886.html.

171. According to the U.S. Energy Information Administration, fossil fuels will still account for about 78 percent of global energy demand in 2040. U.S. ENERGY INFO. ADMIN., INTERNATIONAL ENERGY OUTLOOK 2016 (2016). As of January 2019, there were 1,214 new coal-fired power plants under construction or in the permit process around the globe, including 464 plants in China alone. *See* ENDCOAL,

This global build-out of fossil fuel infrastructure, with decades of projected emissions ahead, will likely make it impossible to stay within the temperature goals of the treaty, regardless of the pledges or actions of more committed nations.[172]

In the 2020s, when scientists are calling for dramatic cuts in global emissions, the majority of Paris parties intend to *increase* emissions.[173] The majority of Paris parties are in the developing world, and with few exceptions, these nations submitted NDCs that permit them to increase emissions, though at a slower rate than their hypothetical business-as-usual projections.[174] These states are not just small players. By 2030, 45 percent of global GHG emissions will come from states that have not yet peaked in their emissions trajectory.[175]

With so many governments committed to increasing their GHG emissions through 2030 and beyond, the stage is set for the 2020s to be a decade in which the scale of necessary reductions will simply overwhelm governments' willingness or ability to achieve them. Governments will likely perceive a high political and economic cost to making pledges that would be collectively sufficient to stay on track toward the two-degree goal.[176] Instead, many of them will dissemble or pursue a strategy of making symbolic gestures toward reduction, the Breakdown scenario I describe in Part III. Conflicts among the parties will likely worsen as acrimony over who is making enough "effort," largely avoided at Paris, will resurface. The incentives for states to withdraw, defect, slow-walk, or stonewall will become stronger in the 2020s, as deeper, more costly carbon reductions are required.

COAL PLANTS BY COUNTRY (UNITS) (2019), https://endcoal.org/global-coal-plant-tracker/summary-statistics/.

172. According to one recent study, projected emissions from existing and proposed fossil fuel infrastructure make it impossible to limit warming to less than 1.5 degrees, and these facilities will use about two-thirds of the available carbon budget for a 2-degree scenario. Dan Tong et al., *Committed Emissions from Existing Energy Infrastructure Jeopardize 1.5 C Climate Target*, 572 NATURE 373 (2019).

173. U.N. Environment Programme, *supra* note 163, at xvi (projecting that only fifty-seven parties will peak their emissions by 2030, leaving well over 100 parties whose emissions will continue to rise even after 2030).

174. *NDC Comparison,* CLIMATE WATCH, https://www.climatewatchdata.org/ndcs-content (last visited May 6, 2019).

175. *See* Pamela Duncan, *Critical Mass of States Will Reach Emissions Peak by 2030 Under Climate Deal*, THE GUARDIAN (Dec. 13, 2015), https://www.theguardian.com/environment /datablog/2015/dec/13/emissions-peak-by-2030-climate-deal-co2. India is one example of a major emitting country that plans to increase its GHG emissions throughout the 2020s. India's NDC, if fully implemented, will likely lead to a 90 percent increase in its GHG emissions between 2014 and 2030. *Analysis: India's Climate Pledge Suggests Significant Emissions Growth Through 2030*, CARBON BRIEF (Feb. 10, 2015, 5:40 PM), https://www.carbonbrief.org/indias-indc.

176. *See* David Victor, *What the Framework Convention on Climate Change Teaches Us About Cooperation on Climate Change*, 4 POL. & GOVERNANCE 133, 137 (2016) (noting that because the Agreement is "organized around goals that are not achievable," it will make the "periodic stocktaking difficult to do with honesty").

D. Conflicts over Climate Finance

Conflicts over climate finance are the last major set of tensions that could tip the Paris Agreement into a downward spiral. Climate finance refers to funds provided by developed countries to developing countries for both mitigation of GHG emissions and for investments in climate change adaptation. In the 2020s, the scale of climate change finance will become central to parties' perceptions of whether the Agreement is working. Reneging on promises for climate finance could hurt the prospects for the treaty as much, or more so, than shortfalls on achieving NDCs.

Developed countries have made substantial climate finance promises. In the 2009 Copenhagen Accord, they pledged to mobilize $100 billion annually in climate finance by 2020, which would be comprised of a mix of public and private sources.[177] In response to U.S. pressure, language regarding that $100 billion annual commitment was excised from the Agreement itself.[178] Instead, that figure was relegated to text of the final report of the Conference of the Parties at Paris.[179]

Many analysts doubt that rich countries will hand over $100 billion in annual climate finance to the developing world.[180] The debate about how much money rich countries can deliver centers around what qualifies as climate finance and whether climate finance is a substitute for, or additional to, other forms of development assistance.[181] Developed nation pledges to the Green Climate Fund, the leading source of governmental climate assistance to the developing world, have totaled $10.3 billion since 2010, but governments have transferred only about $3.5 billion to the Fund.[182] In 2017, President Trump terminated any new U.S. contributions to the Fund.[183] On the verge of the new decade, it seems unlikely that the developed world will raise and distribute $100 billion *annually*

177. U.N. Framework Convention on Climate Change, *Report of the Conference of the Parties on its Fifteenth Session, Held in Copenhagen from 7 to 19 December 2009*, U.N. Doc. FCCP/CP/2009/Add.1 (Mar. 30, 2010); Jim Tankersley, *U.S., China, Others Join Copenhagen Accord on Climate*, L.A. TIMES (Feb. 2, 2010), https://www.latimes.com/archives/la-xpm-2010-feb-02-la-fg-climate-accord2-2010feb02-story.html.

178. *See* Burleson, *supra* note 127, at 17; Tanakasempipat, *supra* note 127.

179. *See* U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, DECISION 1/CP.21, ADOPTION OF THE PARIS AGREEMENT, FCCC/CP/2015/10/Add.1 (Jan. 29, 2016), ¶ 53 (extending the $100 billion goal though 2025 and providing that the parties shall set a new quantified goal prior to 2025).

180. *See* Timmons Roberts & Romain Weikmans, *Roadmap to Where? Is the '$100 Billion by 2020' Pledge from Copenhagen Still Realistic?*, BROOKINGS INSTITUTION (Oct. 20, 2016), https://www.brookings.edu/blog/planetpolicy/2016/10/20/roadmap-to-where-is-the-100-billion-by-2020-pledge-from-copenhagen-still-realistic/.

181. *Id.*

182. RESOURCE MOBILIZATION: GREEN CLIMATE FUND, http://www.greenclimate.fund/how-we-work/resource-mobilization (last visited Sept. 2, 2017); Mike Ives, *Rich Nations Vowed Billions for Climate Change. Poor Countries Are Waiting*, N.Y. TIMES (Sept. 9, 2018), https://www.nytimes.com/2018/09/09/world/asia/green-climate-fund-global-warming.html.

183. Ives, *supra* note 182.

through the 2020s to finance climate change mitigation and adaptation in the developing world.

If developed countries fall short of the $100 billion annual commitment, they could trigger a downward spiral into Breakdown or Breakup. This climate finance commitment has now become a rallying cry for developing states, and many are questioning the Agreement given the likelihood that the commitment will not be fulfilled.[184] If the climate finance promises remain unmet, support for the Agreement among developing countries could erode. Moreover, many developing countries cannot commit to, or implement, substantial reductions in GHG emissions without outside assistance.[185] The money is needed to finance emissions reductions in the developing world, from improving energy efficiency to electrifying transportation systems to reducing deforestation.[186]

During the Paris negotiations, some states explicitly made their NDCs contingent on the availability of climate change finance from the developed world. According to one analysis, NDCs from 111 developing nations mentioned the need for outside financial support to achieve their targets, and of those, thirty-one nations provided quantitative analysis of how much they would need.[187] India, for example, stated that $2.5 *trillion* in new international climate finance would be needed to implement its NDC by 2030.[188]

Climate finance will likely be a major fault line in the Agreement "stocktakes" scheduled to take place in 2023 and 2028. While the media focuses on whether the Green Climate Fund can actually raise $10 billion in the wake of President Trump's termination of U.S. funding,[189] that figure is a far cry from mobilizing $100 billion annually in both public and private sector funding. In the absence of that funding, developing countries may balk at making ambitious commitments.

III. THE BREAKDOWN AND BREAKUP SCENARIOS

Given the tensions described in Part II, the Paris Agreement is now in serious danger of a downward spiral in the 2020s. This downward spiral will be characterized by shortfalls in NDCs, slowing ambition, disengagement, and further withdrawals. With no enforcement mechanisms and no benchmarks for whether any party is fulfilling its fair share of the mitigation effort, the

184. Zhang Yong-Xiang, et al., *The Withdrawal of the U.S. From the Paris Agreement and its Impact on Global Climate Change Governance*, 8 ADVANCES IN CLIMATE CHANGE RES. 213, 215 (2017).

185. Barbara K. Buchner et al., *Global Landscape of Climate Finance 2017*, CLIMATE POL'Y INITIATIVE 10–12 (2017), https://climatepolicyinitiative.org/wp-content/uploads/2017/10/2017-Global-Landscape-of-Climate-Finance.pdf.

186. *Id.*

187. Hana Biru & Joe Thwaites, *INSIDER: Examining Finance Needs in Countries' National Climate Plans (INDCs)*, WORLD RESOURCES INST. (Nov. 27, 2015), https://www.wri.org/blog/2015/11/insider-examining-finance-needs-countries-national-climate-plans-indcs.

188. *Analysis: India's Climate Pledge*, *supra* note 175.

189. Ives, *supra* note 182.

Agreement is still "far from a serious scheme for deep international cooperation."[190]

Should a downward spiral occur under the Agreement, it will likely result in one of two endpoints: Breakdown or Breakup. The two endpoints are not mutually exclusive. Breakdown might be the initial result and might unfold within the next several years, culminating in Breakup further down the road. Either scenario would likely result in ecological catastrophe, as warming would likely accelerate beyond two degrees Celsius under either scenario, and given there is no other treaty in place to constrain the rise in emissions. In this Part, I explore what the Breakdown and Breakup scenarios might look like, their implications for addressing climate change, and what could emerge in the wake of these scenarios.

A. The Breakdown Scenario

In Breakdown, the pledge-and-review process of the Paris Agreement would slow, dissension and acrimony would increase, and the treaty's impacts would be modest. The peer pressure proposition will fail to hold the Agreement together. Parties may not reach their own GHG reduction pledges, they may submit minimal pledges, or they may purposely slow-walk progress toward their own goals, perhaps incensed that major emitters are not making sufficient progress. In Breakdown, the Agreement would remain the principal forum for climate change negotiations, but the commitments made in the 2020s will fall short of the trajectory needed to keep warming to "well below" two degrees Celsius.

The Breakdown scenario could be evident by the time of the first global "stocktake" under the Agreement, scheduled for 2023. That stocktake is meant to inform the preparation of NDCs[191] for a further round of commitments in 2025, but it is not clear how that stocktake will ensure that parties commit to much deeper cuts in emissions. Recall that staying on the two-degree trajectory in the 2020s requires that parties achieve thirteen to fifteen billion tons of GHG reductions beyond their existing NDCs by 2030.[192] How will these cuts be allocated among the parties? What will happen if a party submits an NDC deemed by others to be insufficient? And by what benchmark will parties judge whether a party's NDC represents its "highest possible ambition"?[193]

The lack of clear benchmarks in the Agreement could contribute to Breakdown. There is no definition for appropriate "ambition" in the Agreement.

190. Victor, *supra* note 176, at 138.

191. Paris Agreement, *supra* note 1, at art. 4, ¶ 9.

192. *See* Press Release, UN Environment Programme, *supra* note 165.

193. There are multiple competing views of fairness under the Paris Agreement, given scientific uncertainty, historic emissions versus current and future emissions, and asymmetrical vulnerability to climate impacts. *See* Keohane & Oppenheimer, *supra* note 20, at 143; *see also* Carlane, *supra* note 3, at 15 (discussing studies that have attempted to measure climate equity and noting competing definitions of a "fair" distribution of mitigation burdens).

There is no official body to determine which countries could commit to greater reductions beyond those named in their NDCs, and even if there were, such determinations would devolve in controversies over equity and historic responsibility.[194]

It is not easy to determine who should "do more." Such a process necessarily entails outsiders making judgments about a state's future economic growth, mix of industries, bureaucratic capacity and competence, national priorities, and whether there is some mitigation potential the government has overlooked. In the run-up to Paris, many scholars suggested objective benchmarks by which to measure a party's progress under the Agreement, but none of these suggestions were adopted.[195]

As an example of how progress could stall under Breakdown, consider a pledge from State X in 2015 to cut emissions 30 percent below 2005 levels by 2030. Assume that by 2025 State X commits to reduce emissions an additional 10 percent below 2005 levels by 2040. On its surface, this second NDC is less ambitious than the first NDC. But if State X has experienced rapid economic growth or population growth, if it has taken GHG mitigation measures that have decreasing marginal returns, or if its industrial base is in danger of being globally noncompetitive, an additional 10 percent emissions reduction might be all the "effort" State X can expend on GHG reductions in that time period. It might argue that it can escalate its NDC only if the incremental cost is fully financed by wealthier parties. It might assert that the low-hanging fruit of emissions reductions has already been picked. If pressured by other parties, State X could reasonably defend its pledge as being incrementally more ambitious.

The Agreement itself provides little guidance for what to do in these situations. Parties cannot force particular targets or reduction strategies on other parties. There is no clear method to allocate effort—to determine formally who has to take measures to keep aggregate emissions within the two-degree window. Article 13 of the Agreement establishes a transparency framework for national reporting of emissions, international expert review of the data, and exchange of information on the actions of other parties.[196] But the Agreement is clear that this is not meant to be a process to call out lagging parties. Instead, the Agreement states that "transparency [measures] shall . . . be implemented in a

194. *See generally* Niklas Hohne et al., *Assessing the Ambition of Post-2020 Climate Targets: A Comprehensive Framework*, 18 CLIMATE POL'Y 425 (2017) (surveying the growing literature on this issue).

195. Lena Donat and Ralph Bodle, for example, suggested "dynamic adjustment" triggers that would require a party to submit an NDC based on objective standards, such as elapsed time or the findings of IPCC reports. Lena Donat & Ralph Bodle, *A Dynamic Adjustment Mechanism for the 2015 Climate Agreement: Rationale and Options,* 8 CARBON & CLIMATE L. REV. 13 (2014). They also proposed a committee that would evaluate NDC submissions to determine if they are appropriately ambitious for each country, and an "automatic ratchet-up mechanism" that would increase each party's NDC by some fixed percentage unless the parties negotiated otherwise. *Id.* at 20.

196. Paris Agreement, *supra* note 1, at art. 13.

facilitative, non-intrusive, non-punitive manner . . . and avoid placing undue burden on Parties."[197]

Similarly, the five-year global stocktakes are designed to "assess the *collective* progress towards achieving the purpose of [the] Agreement."[198] Formally, the Agreement does not provide a mechanism to challenge individual parties for their lack of progress, and as discussed in Part I, peer pressure and reputational concerns are not likely to be strong motivators for ambitious action.

Domestic concerns, not the peer pressure proposition, will ultimately determine whether governments submit ambitious NDCs consistent with a two-degree Celsius carbon budget. Governments may calculate that they will not or cannot implement policies consistent with moving along the ratchet mechanism. Most governments will balk at forcing an energy transition on their own economies to achieve 5 to 8 percent annual reductions in GHG emissions—a more aggressive pace of reduction than any nation has ever achieved.[199]

Consequently, the most likely pattern we will see in the 2020s is that developed states will propose NDCs that are only incrementally more ambitious, while developing states will continue to insist on their right to increase GHG emissions to grow their economies. With each review conference, parties will likely tout their ongoing "progress," but their actions, collectively, will be insufficient to prevent catastrophic warming.

In the Breakdown scenario, governments will likely be risk averse, lowballing their pledges and then touting the achievement of their unambitious goals. They may be reluctant to commit to aggressive, long-term targets for emissions reductions because GHG emissions rates, in the final analysis, are not under sole governmental control. Unlike an arms control treaty, where governments can directly control the pace of arms reductions to match their treaty commitments,[200] in climate change the trajectory of a nation's GHG emissions depends on factors outside of immediate government control: the rate of economic growth, the mix of fuels in the economy, technological development, and the actions of millions of private actors.[201] Governments can surely influence these factors, but they do not directly control them. The natural inclination of governments, therefore, is to lowball promises of GHG reductions, rather than to commit to aggressive cuts.

One signal that a Breakdown scenario is occurring is if parties opt to withdraw existing NDCs and submit ones that are *less* ambitious. Such backsliding could perhaps occur after a change of government or in a tit-for-tat

197. *Id.*

198. *Id.* at art. 14 (emphasis added).

199. *See supra* Part II.C.

200. *See* Barry Blechman & Ruth G. Bell, *A Course Adjustment for Climate Talks*, 28 ISSUES IN SCI. & TECH. 26 (2012) (comparing climate change negotiations and arms control negotiations); Victor, *supra* note 176, at 137–38.

201. *See* ESCOR, World Economic Situation and Prospects as of Mid-2019 at 11, U.N. Docs. E/2019/70 (2019) (connecting rise in GHG emissions to global macroeconomic trends).

response to other parties. Some states might want to take advantage of this process simply because they are falling short of their own NDCs.

In 2017, policymakers and scholars extensively discussed the option of weakening an existing NDC as an option for the United States that would be preferable to full withdrawal from the Agreement.[202] Many believed that President Trump, committed to nonaction under Paris, should just modify President Obama's NDC by submitting a much weaker one, avoiding the political fallout from withdrawing from the Agreement.[203]

The Agreement is ambiguous on whether this weakening of NDCs is permissible. Article 4 states that a party "may at any time adjust its existing [NDC] with a view to enhancing its level of ambition . . . ."[204] While some commentators read this provision as a one-way ratchet, permitting adjustments only in an upward direction,[205] others contended that the "with a view" language is hortatory rather than mandatory, and therefore, nothing prevents a party from withdrawing an NDC and submitting a weaker one.[206] With the United States opting to withdraw from the Agreement, this debate remains unsettled, and it is likely to resurface in the 2020s.

The above analysis focuses principally on the ratchet mechanism for NDCs, but Breakdown could also unfold simply through subpar performance on existing NDCs. If it is clear in the next few years that major emitting parties will fall far short of their 2025 or 2030 pledges, it is doubtful that other parties would increase their efforts to counteract the shortfall with the aim of preserving a limited carbon budget. Instead, the most likely outcome is that other parties will feel justified in backsliding themselves, feeling relieved of the stringency of their own NDC. As Simon Caney has observed, if there is a shortfall in a major emitting country's efforts to achieve its NDC, it raises not only a technical issue in the sense that the party will emit more GHGs than anticipated, but also a

202. *See* Bob Perciasepe et al., *Paris Agreement Presents a Flexible Approach for U.S. Climate Policy*, 11 CARBON & CLIMATE L. REV. 283 (2017); Ted Nordhaus & Alex Trembath, *Trump's Paris Agreement Withdrawal in Context: The Polarization of the Climate Issue Continues*, FOREIGN AFFAIRS (June 5, 2017), https://www.foreignaffairs.com/articles/world/2017-06-05/trumps-paris-agreement-withdrawal-context.

203. *Id.*

204. Paris Agreement, *supra* note 1, at art. 4.

205. *See, e.g.*, Lavanya Rajamani, *The U.S. and the Paris Agreement: In or Out and at What Cost?*, EJIL TALK (May 10, 2017), https://www.ejiltalk.org/the-us-and-the-paris-agreement-in-or-out-and-at-what-cost; Doelle, *supra* note 49, at 14 (explaining that while it is implicit that "[p]arties are not to weaken their NDCs at any time, this is not made as explicit in the Paris Agreement").

206. *See, e.g.*, Susan Biniaz & Daniel Bodansky, Ctr. for Energy & Climate Sols., Legal Issues Related to the Paris Agreement 1 (2017), https://www.c2es.org/site/assets/uploads/2017/05/legal-issues-related-paris-agreement.pdf; *see also* Letter from Kevin Cramer et al., Members of Congress, U.S. House of Representatives, to President Trump (Apr. 27, 2017), http://online.wsj.com/public/resources/documents/20170508cramer.pdf (stating "the U.S. should present a new pledge that does no harm to the economy").

"shortfall in justice."[207] Parties will receive the message that NDC shortfalls will be tolerated without severe repercussions.

In sum, because of the tensions discussed in Part II, governments in the 2020s could easily perceive their self-interest as pulling in the opposite direction from the norms that animated the Paris conference in 2015—norms of reciprocity and cooperation. According to Robert Keohane and Michael Oppenheimer, this dynamic could lead to a "low-level equilibrium," in which future commitments are no more ambitious than current ones.[208] In the low-level equilibrium, wealthy nations of Europe and North America as well as China and India would "pursue essentially business as usual under the cover of an agreement (thereby protecting their reputations) . . . ."[209] Poor and middle-income countries will "pretend to combat climate change and the rich countries will pretend to pay them for doing so."[210]

Procedural compliance could continue in this low-level equilibrium—the Breakdown scenario—but substantive effectiveness would be low. The result would be catastrophic ecosystem damage.

B. The Breakup Scenario

What if cooperation falters even further than in the Breakdown scenario just described? A lack of progress under the ratchet mechanism could seriously destabilize the Agreement. Important parties may withdraw from the Agreement, following President Trump's lead, or they might disengage without formal withdrawal. Would the Paris Agreement then fall apart or fall into irrelevancy? Could Breakdown lead to Breakup?

The Breakup scenario is the collapse of the Agreement. It would be characterized by persistent unbridgeable conflicts and multiple parties formally withdrawing or otherwise disengaging from the treaty.

It is difficult to assign any probability to Breakup, but it is clear that the underlying *incentives* for Breakup exist even now. Climate change is an unusually difficult environmental, economic, and social problem—perhaps uniquely difficult. Scholars have called it a "super-wicked" problem.[211] The philosopher Stephen Gardiner has explained that inaction results from a "perfect moral storm" in which governments and individuals justify passing burdens to

207. Simon Caney, *The Struggle for Climate Justice in a Non-Ideal World*, 40 MIDWEST STUD. IN PHIL. 9, 12 (2016).

208. Keohane & Oppenheimer, *supra* note 20, at 149–50.

209. *Id.* at 149.

210. *Id.* at 150.

211. Lazarus, *supra* note 20, at 1157 *(*explaining that climate change legislation "is peculiarly vulnerable to being unraveled over time" because "it imposes costs on the short term for the realization of benefits many decades and sometimes centuries later").

future generations, believe they lack agency over the problem, and fail to form clear judgment about the ethical stakes.[212]

In climate change, the benefits of any nation's GHG mitigation efforts flow primarily to the rest of the world (and of course in part to the nation itself), but the costs of mitigation fall on domestic industries, taxpayers, and ratepayers. The incentives for long-term cooperative action under these conditions are particularly "malign."[213] Add to this the intergenerational nature of the problem, where the near-term costs of GHG mitigation harm specific domestic industries, while the benefits of avoided emissions extend principally to persons in future generations.[214]

Under these conditions, there are strong incentives for parties to free ride by "posing" as willing actors while actually doing not much at all. Indeed, as Robert Keohane and David Victor have argued, many parties are participating in the Paris process not because they want to save the planet, but because they want to extract various benefits from other states, including financial assistance.[215] As a result, their NDCs are minimally sufficient, and they have little interest in strengthening them to the point of making deep economic changes to limit global warming.[216]

As free riding becomes evident in the face of increasingly severe climate impacts, committed states may conclude that they are being duped. Their incentive to carry the laboring oar on emissions reductions may erode. They may look for the exits—or they may look for alternative GHG reduction arrangements, outside the formal structure of the Agreement.[217] These alternatives could include negotiating GHG reductions through what David Victor has called "clubs" of nations, to avoid the need to reach a consensus among more than 180 parties.[218] Parties within a negotiating club might make aggressive offers to each other that are contingent on similar offers from other

212. STEPHEN GARDINER, A PERFECT MORAL STORM: THE ETHICAL TRAGEDY OF CLIMATE CHANGE 22–40 (1st ed., 2011).

213. Keohane & Victor, *supra* note 20, at 4.

214. *See* GARDINER, *supra* note 212, at 141 (referring to the "intergenerational storm" of climate change).

215. Keohane and Victor observed that there are several clusters of countries in the climate regime with different interests, including wealthy nations in the Organization for Economic Co-operation and Development, high-emitting middle-income countries such as China, low-lying island nations, and other blocs. According to Keohane and Victor, only one cluster of states (primarily in Europe) is motivated in part by an interest to provide global ecosystem benefits by addressing climate change. Other states submitted NDCs to achieve domestic "co-benefits" such as reduced air pollution, to extract side payments from wealthier players, to use their enormous future growth in emissions as a bargaining chip, or to have a seat at the table to limit their vulnerability to sea-level rise and other climate impacts. Keohane & Victor, *supra* note 20.

216. *See, e.g.*, *id.* at 145 (explaining that aggressive action on climate mitigation "will be difficult for democratic publics and unpopular with authoritarian leaders striving to gain in wealth and power. States will therefore seek when possible to employ bargaining power to shift these costs onto others.").

217. *See, e.g.*, VICTOR, *supra* note 33, at 22–24 (discussing alternatives to the UNFCCC climate negotiations).

218. *Id.*

members, and they could combine these offers with strict verification measures.[219] Parties might also turn to trade sanctions, border taxes, or bilateral financial assistance to induce other parties to take more ambitious reductions.[220]

Breakup could be sparked both by geopolitical events exogenous to the treaty and by some of the internal fractures and stressors documented in Part II.

The exogenous events could include war or global economic recession that would divert the attention of governments and damage the prospects for long-term cooperation. Breakup could also occur if governments perceive that the effects of climate change (such as intense heat waves, flooding, ice-sheet breakup, crop loss, or mass migrations) are becoming intolerable. In the face of such environmental shocks, would governments commit to stronger climate action, or would these crises trigger authoritarianism, nationalism, and possible armed conflict? The latter scenarios seem far more likely. Indeed, prolonged political, economic, or environmental disruption is likely to occupy the full attention of governments and make climate change mitigation fall off the agenda, or at least become a lower priority.[221]

During such disruption, many parties could withdraw from the Agreement, and the remaining committed parties might perceive that some more aggressive structure is needed than the voluntary system of pledge and review under the Agreement. Such events would highlight for the world that the slow pace of reductions under the Agreement, and its voluntary architecture, are not up to the challenge of addressing climate disruption.[222]

Longstanding internal fractures, left unresolved at Paris, could also reemerge in the 2020s to derail the Agreement. In my view, the issue that is most likely to derail the Agreement is grievances over burden sharing and equity. When it becomes clear that major emitting nations are not on track to achieve their NDCs and that second- and third-round NDCs are not sufficient to keep warming to less than 2 degrees Celsius, let alone 1.5 degrees Celsius, burden sharing and equity will become flashpoints of dissension and conflict.

The issue of how to allocate the burden of reducing emissions has been controversial at least since 1992, when the United Nations Framework Convention on Climate Change assigned different responsibilities to developed and developing states.[223] The term adopted for this bifurcation of responsibility in the 1990s was "common but differentiated responsibility."[224] Differentiating

219. *Id.*

220. *See* Flannery et al., *supra* note 16.

221. *See* Peter Howard & Michael A. Livermore, *Sociopolitical Feedbacks and Climate Change*, 43 HARV. ENVTL. L. REV. 119 (2019) (concluding that political and military conflict negatively influence environmental treaty formation).

222. *See* Young, *supra* note 13, at 124, 131 (noting that public arousal around climate change would increase dramatically if there is "some sort of climate shock that jolts wide swaths of the public into taking climate change seriously").

223. Savaresi, *supra* note 59, at 16–17 (describing the different treatment of developed and developing nations under the UNFCCC and the Kyoto Protocol).

224. Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107 (1992), art. 3.

responsibility for climate change, with developed nations bearing most of the burden of emissions reductions, was crucial for securing participation by the developing world in any kind of climate change regime.[225] In the view of developing nations, wealthy nations had to undertake the lion's share of emissions reductions because of their historic responsibility for the problem and their greater financial capacity.[226] Precisely *how much* of the GHG reduction effort should be undertaken by developed countries versus developing countries has been a contentious debate for a generation.[227]

Cognizant of the polarizing nature of these burden-sharing and equity issues, the parties chose a completely different structure for the Agreement: they "self-differentiated."[228] During the Paris talks, parties punted on the question of an equitable allocation of emission reduction obligations and instead determined for themselves how much mitigation effort was appropriate for their national circumstances, with no internationally agreed allocation. Although the Agreement mentions the principle of common but differentiated responsibility,[229] discussions of concrete allocation rules for the shared carbon budget were deemed off the table at Paris.[230] The voluntary system of self-differentiation was essential to winning agreement at Paris, yet it meant sidelining and postponing the most contentious issues.[231]

To assert that Paris has *permanently* side-stepped acrimonious debates over burden sharing, just distribution, and equity, however, is "naïve and wishful thinking."[232] These long-standing fractures will come roaring back this decade. By the mid-2020s, an implicit allocation of effort, evident in the NDCs, will become clear to all the parties, and tensions over fair distribution of the

225. Justin Lee, *Rooting the Concept of Common but Differentiated Responsibilities in Established Principles of International Environmental Law*, 17 VT. J. ENVTL. L. 27, 32 (2015); Rowena Maguire, *The Role of Common But Differentiated Responsibility in the 2020 Climate Regime*, 7 CARBON & CLIMATE L. REV. 260, 264 (2013).

226. Lee, *supra* note 225, at 33–34.

227. Alex Wang, *Regulating Domestic Carbon Outsourcing: The Case of China and Climate Change*, 61 UCLA L. REV. 2018, 2035 (2014); Fabio Morosini, *Trade and Climate Change: Unveiling the Principle of Common but Differentiated Responsibilities from the WTO Agreements*, 42 GEO. WASH. INT'L L. REV. 713 (2010).

228. Lavanya Rajamani, *Differentiation in a 2015 Climate Agreement*, CTR. FOR CLIMATE & ENERGY SOLUTIONS 2 (2015), https://www.c2es.org/docUploads/differentiation-brief-06-2015.pdf.

229. Paris Agreement, *supra* note 1, at art. 2 ("This Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.").

230. Justin Gillis, *Paris Talks Avoid Scientists' Idea of 'Carbon Budget,'* N. Y. TIMES (Nov. 28, 2015), https://www.nytimes.com/2015/11/29/science/earth/paris-climate-talks-avoid-scientists-goal-of-carbon-budget.html?mcubz=0.

231. Falkner, *supra* note 113, at 275 ("the new bottom-up structure [of the Paris Agreement] avoids any attempt to resolve this core distributional conflict").

232. Chukwumerije Okereke & Philip Coventry, *Climate Justice and the International Regime: Before, During, and After Paris,* 7 WIRES CLIMATE CHANGE 834, 847 (2016).

mitigation burden will likely surge as parties collectively overshoot the trajectory toward the two-degree goal.[233]

Will the parties continue to postpone specifying a plan for who has to take action to close the emissions gap, even as the window to achieve the two-degree goal is about to close? And will parties stand by the treaty even as its two-degree goal becomes unattainable? In the face of a lack of allocation rules, states may resist making second- and third-round NDCs until the major emitters ramp up their emissions cuts. For the Agreement to hold together in the long term, the distribution of burdens represented in the NDCs must be perceived by most states as fair.[234] If not, parties may exit.

It is hard to predict what would lie on the other side of a Breakup scenario. If Breakup unfolds, committed governments may scramble for some alternative mechanism to drive emissions reductions as climate impacts become even more severe.[235] Governments might return to a top-down climate architecture with enforceable targets and timetables and a clear allocation of effort, as under the Kyoto Protocol, or perhaps they may seek to amend the Paris Agreement itself to specify an allocation of effort.[236] By the end of the 2020s, the current Agreement may prove to be a temporary way station on the road to a more durable and binding agreement.

Far from solving intractable collective action problems and divisions over burden sharing, the Agreement might just have papered them over for a while. These divisions will reemerge when the needed emissions reductions become steeper. Breakup—the collapse of the Agreement—is a plausible outcome of these conflicts.

CONCLUSION

The Paris Agreement followed twenty years of frustrating climate talks with little progress, and it has to be evaluated against that backdrop. The shift to a voluntary pledge-and-review system was the crucial change in policy architecture that allowed consensus to be reached at Paris, surmounting policy deadlock. Now that the Agreement is in its implementation phase, however, the voluntary structure, lack of sanctions, and lack of benchmarks for allocating effort will likely hinder further cooperation and reciprocity. States will continue to submit NDCs that reflect their self-interest, but these NDCs will in all likelihood be collectively insufficient to close the emissions gap.

233. *See* Keohane & Oppenheimer, *supra* note 20, at 143 (noting that the "climate problem is plagued by multiple difficulties in determining what is fair").

234. *See* Joseph E. Aldy, *Evaluating Mitigation Effort: Tools and Institutions for Assessing Nationally Determined Contributions*, HARVARD PROJECT ON CLIMATE AGREEMENTS 7 (2015) ("[w]hen most large emitters perceive the climate change regime as fair, there is at least the possibility of countries and groups of countries increasing their mitigation contributions over time").

235. *See, e.g.*, VICTOR, *supra* note 33, at 22–24.

236. *Id.*

The Agreement is not unique in its fragility. Most multilateral treaties designed for long-term cooperation are prone to defections, free riding, and internal fractures.[237] In an anarchic international system with no hegemon and no sovereign enforcement power, it is difficult to bring nations together in consensus and then sustain cooperation over time.[238] Under the Agreement, however, Breakdown and Breakup are not just theoretical possibilities. They are plausible near-term outcomes. Given the stressors on the Agreement that have emerged since 2015, especially the U.S. withdrawal and the likely shortfall in states' progress toward their own voluntary NDCs, it is now foreseeable that the ratchet mechanism will stall.

A downward spiral of dissension, dysfunction, and disengagement is a plausible future for the Agreement, and Breakdown or Breakup may unfold within the next decade. Such outcomes would be disastrous and threaten the habitability of many parts of the planet. To avoid these outcomes, governments must show far more political will, investment, and sacrifice than they have expended so far to address climate change.

237. Keohane & Victor, *supra* note 20, at 2 (discussing other multilateral regimes such as the World Trade Organization and the Montreal Protocol).

238. *Id.*