Received: 4 October 2018 | Revised: 23 January 2019 | Accepted: 4 February 2019

DOI: 10.1002/wcc.583

WIREs CLIMATE CHANGE WILEY

ADVANCED REVIEW

Institutional and environmental effectiveness: Will the Paris Agreement work?

Radoslav Dimitrov[1] | Jon Hovi[2] | Detlef F. Sprinz[3] | Håkon Sælen[4] | Arild Underdal[2,4]

[1]Department of Political Science, Western University, London, Ontario, Canada

[2]Department of Political Science, University of Oslo, Oslo, Norway

[3]Potsdam Institute for Climate Impact Research, and University of Potsdam, Potsdam, Germany

[4]Centre for International Climate and Environmental Research (CICERO), Oslo, Norway

Correspondence
Jon Hovi, Department of Political Science, University of Oslo, Oslo, Norway.
Email: jon.hovi@stv.uio.no

Funding information
Research Council of Norway, Grant/Award Number: 209701

Edited by Heike Schroeder, Domain Editor, and Mike Hulme, Editor-in-Chief

The 2015 Paris Agreement (PA) has been widely hailed as a diplomatic triumph and a breakthrough in global climate cooperation. However, it is commonly accepted that the PA's collective goal—keeping global warming "well below" 2°C above preindustrial levels—remains ambitious. Making matters even more challenging, in 2017, global CO_2 emissions resumed growth after 3 years of near standstill. In 2018, this growth accelerated. It is therefore extremely important that the PA's institutional architecture meet expectations concerning its ability to induce member countries to promise and deliver emissions reductions. This study offers a review of the rapidly growing literature on the PA, to assess its strengths and weaknesses, its significance, and its prospects. We focus on evaluations of its institutional structure and its ability to induce member countries to implement policies. We frame the issues as a trilemma: the challenge of simultaneously satisfying all three main conditions for effectiveness—broad participation, deep commitments, and satisfactory compliance rates. Based on our review, we conclude that the key challenge for the PA will likely be to facilitate sufficiently fast ratcheting-up of nationally determined contributions, while keeping compliance rates high.

This article is categorized under:
Policy and Governance > Multilevel and Transnational Climate Change Governance

KEYWORDS
ambition, climate change cooperation, compliance, Paris Agreement, participation

1 | INTRODUCTION

Following decades of very modest progress in international negotiations, the 2015 Paris Agreement (PA) on Climate Change (United Nations Framework Convention on Climate Change, 2015) was hailed worldwide as a breakthrough in climate diplomacy. Being the first global climate agreement that bridges the North–South divide, the PA imposes policy obligations on all countries. Comprehensive in its thematic scope, it contains legal provisions on mitigation, adaptation policies, international climate finance, reporting and transparency, and cooperative mechanisms such as technology transfer.

How significant is the PA?[1] Analyzing its importance for global climate governance is complicated for several reasons. First, it is characterized by remarkable complexity and does not follow the traditional model of international law. Although legally binding, it contains a mixture of mandatory and laissez-faire provisions (Bodansky, 2016) and is therefore ambiguous and open to interpretation. Second, it is designed to evolve over the medium- to long-term future and governments continue to negotiate details of its implementation. Finally, the PA's institutional effectiveness is distinct from its environmental

 © 2019 Wiley Periodicals, Inc.

effectiveness, in the sense that the environmental outcome will depend on multiple factors, some of which are unrelated to the agreement.

This study reviews the rapidly growing literature on the PA, aiming to assess its strengths, weaknesses, significance, and prospects for affecting climate governance. We synthesize existing publications by both practitioners and academics to provide an aggregate and comprehensive evaluation of the agreement's institutional structure. In particular, we try to answer the following question: *Based on the literature, to what extent should we expect the PA's institutional architecture to be effective in influencing policy behavior?*

We begin by summarizing the PA (Section 2) and reviewing evaluations by practitioner-scholars who participated in its negotiation (Section 3). We then review the purely academic literature, using a framework described in Section 4. This framework is based on a trilemma—the challenge of simultaneously achieving all three conditions vital for effectiveness: broad participation in the treaty (Section 5), deep policy commitments by participating countries (Section 6), and satisfactory levels of compliance (Section 7). Finally, we draw some conclusions based on patterns identified in our review (Section 8).

2 | THE PARIS AGREEMENT: A SUMMARY

The PA combines a top-down approach that imposes legally binding obligations on countries with a bottom-up approach to policy formulation that leaves much up to state governments. It leaves governments with full discretion over domestic policies, and rests on "nationally determined contributions" (NDCs) to global climate policy. At the same time, it creates strong obligations to develop, implement, and regularly strengthen such actions, while subjecting national policies to a robust system of international oversight.

Key provisions include a global objective of holding the temperature increase to "well below 2°C" and a commitment to "pursue efforts to limit the temperature increase to 1.5°C" (Article 2). The long-term policy goals are to reach peak global emissions "as soon as possible" and to achieve zero net emissions in the second half of this century (Article 4.1). This vague language is balanced by binding clauses on national actions: "Each Party shall prepare, communicate and maintain successive NDCs that it intends to achieve" (Article 4.2). Domestic policy programs are subject to a strong transparency and monitoring system that places extensive informational requirements on countries (Article 13). In particular, requirements related to mitigation are defined in the strongest possible legal language ("each Party shall"). Recorded in a public registry maintained in Bonn, Germany, national plans and targets are open to international scrutiny.

Notably, the PA is programmed to grow stronger by requiring countries to revise domestic policy plans and adopt more stringent targets every 5 years, with strongly worded language intended to guarantee policy "progression" over time (Article 4.3). This "ratcheting mechanism" was extensively negotiated over several years, with strong support from the European Union, Brazil, and others. Aiming for ever-accelerating policy actions by countries and constant evolution of the global policy regime, these provisions could have enormous significance (Dimitrov, 2016, p. 2; Rajamani, 2016, p. 501). A global stocktake of collective progress shall be conducted in 2023 and every 5 years thereafter, presumably to inform countries' future policymaking. The PA is also subject to further negotiations. For example, at the 2018 Katowice meeting, governments agreed on (most of) the details of a "rulebook" for implementation policies.

The PA's strengths include principled obligations to act, regularity and progression of national policy development, as well as provisions for international transparency and accountability. The agreement is weaker on the long-term global goal for emission reductions, adaptation policy, liability and compensation for climate impacts, and technology transfer. Politically, the PA arguably favors developed countries of the North, who won most major battles (Andresen, 2015; Bodansky, 2016; Dimitrov, 2016). The new climate deal meets all key demands of the United States, while being least fair to the African Group and other least developed countries by not including references to their special circumstances.

3 | INSIDERS' VIEWS

Following the Paris conference, several practitioner-scholars who participated in the negotiations published analyses of the PA. Several common themes emerge from these insider analyses.

First, the PA is viewed as a political success and a major historic breakthrough in the history of global climate negotiations (Bodansky, 2016; Brun, 2016; Dimitrov, 2016; Doelle, 2017; Rajamani, 2016). Insiders describe the PA as "a culmination of decades of climate diplomacy" (Brun, 2016, p. 121), and "a historic achievement in multilateral diplomacy" that is the "most ambitious outcome possible in a deeply discordant political context" (Rajamani, 2016, pp. 493–94). In contrast to past climate negotiations, countries demonstrated reciprocal willingness to compromise, and the PA is balanced in that most players made sacrifices and gained something in return (Dimitrov, 2016; Kinley, 2017). A veteran negotiator, known for his vocal advocacy

for the strongest possible treaty, recognized overall progress and wrote that island states generally welcomed the PA "as a good outcome albeit not a great one" (Fry, 2016, p. 105). Even skeptical commentators generally disappointed with the PA regard it as the best possible outcome, given political disagreements (Clémençon, 2016). Insiders also stress groundbreaking, innovative features of the PA, including the move away from strict differentiation between developed and developing countries (Rajamani & Guerin, 2017).

Second, the PA is a treaty under international law, albeit unorthodox (Bodansky, 2016; Bodle & Oberthür, 2017). International lawyers on the inside emphasize that the PA entails extensive binding legal obligations on countries (Bodansky, 2016; Mace & Verheyen, 2016; Rajamani, 2016). This outcome is particularly significant given that all legal options were on the table, and that the accord's legal nature was not settled until the second week of negotiations in Paris. India in particular insisted that the agreement's contents be finalized before its legal form, meaning we could have had a non-ratifiable, nonbinding instrument.

Most insiders also recognize that the PA is not a conventional treaty that follows the top-down model of international law. It is a facilitative rather than prescriptive instrument. As one analysis puts it, the PA uses "legally soft language that nudges but does not prescribe" (Bodle & Oberthür, 2017). It defines aspirational goals and establishes normative expectations (Rajamani, 2016), while some provisions create obligations of conduct rather than results (Ibid.; Bodansky, 2016). Its form reflects the strong preferences of the United States, China, and India, who opposed mandatory achievement of targets (Dimitrov, 2016; Rajamani, 2016, p. 498). Assessing its impact therefore requires a holistic perspective. Narrowly focusing on individual legal provisions would be misleading, since the dynamic interaction of legal provisions on mitigation, transparency, and progression is equally important (Winkler, 2017).

Third and importantly for our purposes, technical and legal experts involved in the negotiations believe the agreement has a strong potential for being effective. Recently, members of the United Nations Framework Convention on Climate Change (UNFCCC) secretariat and others close to the process contributed to a book that draws the broad conclusion that the PA is equipped to achieve the ambitious goals it contains (Klein, Carazo, Doelle, Bulmer, & Higham, 2017). One insider writes, "we should expect to see consistent over-achievement among Parties" because of political momentum the PA is generating (Higham, 2017).

Yet, a fourth common theme among insiders is uncertainty about the future. While all consider the PA as a major pillar of the global climate policy regime, they emphasize the contingent nature of its potential impact. Most agree that it is too early to tell and that the result depends on domestic developments (Clémençon, 2016; Winkler, 2017). Some emphasize the "interpretative possibilities" engrained in the treaty's text and the room for legal heuristics regarding some provisions (Rajamani, 2016). Others stress the broader sociopolitical context, vested interests in the fossil-fuel economy, and whether investments will continue to flow toward renewable energy (Clémençon, 2016; Higham, 2017).

Finally, theoretical explanations of the Paris outcome by insiders are scant. One account emphasizes the role of organizational leadership, stressing the entrepreneurial leadership of the High Ambition Coalition in bridging the North–South divide (Brun, 2016). Another study highlights process variables, such as negotiating strategy and organizational tactics. It argues that negotiations succeeded because of the skilled use of secrecy, entrepreneurial leadership, and superb organizational tactics by the French government, together with persuasive argumentation by the European Union and island states that altered policy preferences, changed actors' minds about the wisdom of climate policy, and facilitated social learning (Dimitrov, 2016). A more widely shared perspective is compatible with realism and concerns the pivotal role of the United States. Most insider and outsider observers agree that the PA satisfies most US policy preferences under the Obama administration.

Insiders tend to ascribe virtually all the PA's weaknesses and less binding provisions to the United States. During the preceding years of negotiations, it became clear that the agreement's shape would be constrained by domestic US politics and would have to rely on the US President's ability to sign an executive agreement without involving Congress. The European Union, most island states (AOSIS), and a coalition of Latin American countries (AILAC) pushed for a legally binding treaty with mandatory national mitigation policies and quantified global targets. However, the United States opposed binding commitments concerning mitigation and finance so adamantly that other countries had to choose between a weaker global treaty with US participation and a stronger treaty without US participation (Dimitrov, 2016). The US delegation was singularly responsible for turning mitigation policy "commitments" into "contributions" in the NDCs. It was also responsible for deleting the definitive word "fulfill" in relation to NDCs, thereby weakening legal obligations to implement and achieve policy results. Finally, it was responsible for making developed country mitigation policy less legally binding, by replacing the strong word "shall" with the legally weaker "should" (Dimitrov, 2016; Fry, 2016; Rajamani, 2016). Where the United States clearly failed was on the issue of loss and damage, where agreed provisions were a victory (albeit a moderate one) for island nations (Article 8). The United States made strong efforts yet did not succeed in keeping loss and damage completely out of the PA, or in folding it under the adaptation chapter (Fry, 2016).

4 | GOVERNING GLOBAL CLIMATE CHANGE: A TRILEMMA

Barrett (2008, p. 244) suggests that "a climate treaty must achieve three things. It must get countries to participate; it must get participants to comply; and it must do both of these things even as it requires parties to reduce their emissions substantially.[2] It would be easy to design a treaty that satisfied one or two of the conditions, but success depends on meeting all three of them—no exceptions." Put differently, there might be a tradeoff between the scope of participation, depth of obligations, and high compliance levels.

Perhaps the best-known trilemma in political economy originated from the Mundell–Fleming model (which contributed to Mundell's being awarded the Nobel Prize in Economics in 1999).[3] This model encapsulates the trilemma of global economic integration: Countries may enjoy any combination of two aspects: monetary autonomy (setting one's interest rate), choice of exchange rate system (fixed/pegged or free/floating), and free capital mobility. However, it has been shown theoretically and through empirical work that not all three goals can be fully achieved simultaneously. Economists have discussed this "impossible trinity" extensively (e.g., Bluedorn & Bowdler, 2010; Krugman, 1999; Obstfeld, Shambaugh, & Taylor, 2004; Obstfeld, Shambaugh, & Taylor, 2005; Obstfeld, Shambaugh, & Taylor, 2010).

We consider all of Barrett's (2008) three components at length later (Sections 5–7). He is right in suggesting that it is fairly easy to achieve any one of these components to a high degree in a climate agreement. For example, the PA quickly achieved very broad participation (see Section 5). Similarly, deep commitments could presumably be achieved in an agreement between only the most enthusiastic countries. Finally, high compliance rates could be ensured by simply watering down commitments to near business-as-usual (BAU) levels.

While high scores on two components might also be achieved, it would likely be accompanied by a very moderate score on the third. For example, only few countries would likely be willing to participate in a climate agreement with deep commitments and strong enough enforcement provisions to ensure full compliance.

Thus, it appears that Barrett's (2008) dictum for effective global climate (and other environmental) agreements resembles the impossible trinity. Absent a cost-effective and socially acceptable technical genie, the trilemma may lead to trade-offs that politicians seeking re-election must contend with. In the next three sections, we consider the extent to which the PA is expected to achieve broad participation, deep commitments, and high compliance.[4]

5 | PARTICIPATION

5.1 | Actors

The PA stands out as having the most inclusive set of commitments ever made by UN members to climate change mitigation. As of January 14, 2019, 197 Parties had signed the PA and 184 had ratified it, while 181 had submitted an NDC.[5] These 181 Parties were responsible for about 90% of global greenhouse gas (GHG) emissions. Russia—responsible for about 5% of global GHG emissions—was the largest emitter that had not ratified the agreement; however, Russia had submitted an NDC.

A major setback concerning participation in the PA occurred in June 2017, when President Trump announced his intention to withdraw the United States from the PA. He also vowed to cease domestic implementation immediately. However, the short-term effects of his decision on actual US emissions need not be as large as some initially feared. Domestic countermoves include, inter alia, establishing the United States Climate Alliance, a joint initiative led by 16 governors, whose states contribute about 46% of US gross domestic product (GDP) (www.usclimatealliance.org). Moreover, despite serious doubts among conservative Republicans, most Americans want climate scientists to have a major role in climate policymaking (Pew Research Center, 2016). Finally, while one plausible prediction would be that several other governments might see President Trump's decision as an invitation to save money by following the United States to the exit, Victor (2017) points to the possibility for other major powers to lead, particularly China, as having greater long-run importance. Victor's succinct summary of the current US–China relationship says that whereas America is leaving, China is saying it will remain.[6]

5.2 | Participation: Universal and differentiated

Since their beginning, UNFCCC negotiations have struggled with stark asymmetries between "guilt" in causing GHG emissions and capacity to alleviate them on one hand and vulnerability to the consequences those emissions could generate on the other. Together, the largest GHG emitters—China, the United States, and the European Union—account for more than half of aggregate world emissions, while the 100 states emitting least account for no more than 3–4% (World Resources Institute, 2017). By using NDCs as the main basis for commitments, the PA acknowledges that inviting poor countries also to develop

and submit their own plans might help them identify projects, for example, in energy supply, that make good sense at local or national levels.

This procedural change does not imply that external funding will no longer be needed to improve living conditions in the South. Nor does it suggest that the pattern observed by Rokkan (1966, p. 105) in domestic politics—"votes count but resources decide"—is no longer valid at the international level. Rather, the wide scope for domestically promoted projects suggests that regular follow-up meetings will be critical in developing pragmatic and mutually beneficial modes of cooperation across the North–South divide.

Even if progress is made in developing North–South cooperation, vulnerable groups may point to ongoing *environmental* processes—such as sea-level rise, desertification, and exhaustion of essential natural resources (e.g., clean water)—as threats that might force them to leave their homelands and face an even more uncertain future elsewhere (Intergovernmental Panel on Climate Change, 2014). Under such conditions, the PA relies heavily on substantial increases in contributions from large and better-off countries. For most donor countries, however, support at the level required will likely be not politically feasible unless significantly moderated through cost-saving technological advances or other major innovations.

5.3 | Prospects of coalition building

The prospects for progressive coalition building depend heavily on the relationship between *coalition builders* and *veto players*. The group of coalition builders has at its core seriously concerned activists who would likely become members of a winning coalition, were such an entity to emerge.[7] Such a coalition would likely bring together rich and poor countries, each largely respecting challenges facing the other side. Coalition builders would like to see a genuinely progressive global regime emerge from the PA.

The veto player group constitutes a somewhat loose coalition consisting mainly of major oil and gas producers whose wealth depends upon the export of fossil fuels. They are keen to preserve access to attractive markets, mostly still found in rich countries. Recognizing that future market prospects will likely change, some major oil and gas producers are investing heavily in large solar energy plants, aimed mostly at domestic markets. Such investments might nonetheless be interpreted as indicating that even major oil and gas producers are preparing for change.

Interestingly, it seems that during the past 10 years or so, these groups have somewhat converged on a common understanding of three basic normative principles that can guide climate change negotiations (Mattoo & Subramanian, 2012; Müller, Höhne, & Ellermann, 2009; Underdal & Wei, 2015). One such principle says that, in general, actors are *responsible* for damage generated by their activities. Another principle focuses on intellectual and financial *capabilities* to develop effective alternatives to fossil fuels. Given gaps between rich and poor, this criterion is usually translated into a rule requiring that the rich help the poor exploit renewable or low-carbon energy sources. The third principle elevates *basic human needs* to the status of an indisputable criterion. All these principles are frequently invoked and rarely disputed. Even President Trump's abrupt decision to withdraw the United States from the PA seems to be more an attack on the advice of the Intergovernmental Panel on Climate Change (IPCC) and the seemingly unfair distribution of obligations among rich countries than an attack on general norms for assisting poor developing countries.

Finally, we also see significant growth in activities of many nongovernmental organizations and transnational networks of cities and other municipalities in developing "private regulations," broadly defined as voluntary standards, rules, and practices (Auld & Gulbrandsen, 2013, p. 397). Studies assessing such regulations' effectiveness show mixed results (Chan, Falkner, Goldberg, & van Asselt, 2018; Green, 2014; Gulbrandsen & Auld, 2016; Michaelowa & Michaelowa, 2017). Most often, it seems schemes certifying well-defined (market) performance standards and involving "synergy with government regulations" (Green, 2013, p. 2) obtain higher scores than do more diffuse and often less consequential declarations of intent.

6 | AMBITION AND PROGRESSION OVER TIME

Three elements of the PA are particularly relevant for assessing its ambition level: global goals, current NDCs, and the framework of obligations and expectations for future NDCs. Studies quickly established that current NDCs are insufficiently ambitious to be consistent with the collective temperature goals. Therefore, whether the PA will be effective in achieving its mitigation goal depends on whether the third element will facilitate a progression of ambition over time.

6.1 | Global goals

The goal to limit warming "to well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C" has been called the PA's centerpiece (Rajamani & Guerin, 2017). The reference to 1.5 C was championed by the

most vulnerable countries and achieved through negotiating with Organisation for Economic Co-operation and Development (OECD) countries (Brun, 2016) and the Arab Group (Rajamani & Guerin, 2017). Scholars have questioned not whether these limits are ambitious, but whether they are achievable (Goodwin et al., 2018; Millar et al., 2017; Raftery, Zimmer, Frierson, Startz, & Liu, 2017). "Even a realistic crash course program to cut emissions will blow through 2°; 1.5° is ridiculous" (Victor, 2016).

6.2 | National targets

A report by the UNFCCC secretariat determined already prior to COP21 that submitted NDCs fail to put emissions on a path consistent with limiting warming to 2°C (United Nations Framework Convention on Climate Change, 2015), a conclusion since confirmed by others (e.g., Fawcett et al., 2015; Höhne et al., 2017; Millar et al., 2017; Rogelj et al., 2016). All studies concur that current implementation of the PA will not suffice to meet the PA goals. Already implemented policies will result in stabilization of global emissions in the second half of the century and a temperature rise of 3.6°C. Even assuming full future implementation of the declared NDCs, the global temperature is expected to rise by 2.7°C by 2100 (Höhne et al., 2017, pp. 19–20). Therefore, the environmental effectiveness of the PA is presently low. Per Keohane and Victor (2016), current NDCs constitute "shallow coordination"—not negligible yet not nearly ambitious enough. The discrepancy between temperature goals and NDCs highlights that the central challenge of the national determination approach is to generate the aggregate ambition level needed (Friedrich, 2017). We now assess how the PA addresses this challenge.

6.3 | A novel approach to fostering ambition

Several scholars have highlighted that the PA represents a novel approach, both compared with the past climate regime and with other environmental regimes. It consolidates a transition from a "regulatory" model of binding, negotiated emissions targets to a "catalytic and facilitative" model aiming to induce coordinated policy shifts (Hale, 2016). Falkner (2016) argues it heralds a new era in international climate politics, calling it a framework for making voluntary pledges for international comparison and review ("pledge-and-review"), in the hope that naming and shaming will increase ambition. Many scholars have noted the framework mixes top-down and bottom-up elements. This new approach emerged more by default than by design, because a purely top-down targets-and-timetables approach would have been a simpler way to achieve temperature goals, but was politically infeasible (Rajamani & Guerin, 2017). However, the Paris approach can also be defended using managerial theories of international relations (Doelle, 2017). The PA relies on norms as mechanisms for strengthening ambition, while doing little to restructure incentives (Bang, Hovi, & Skodvin, 2016). A critical view dismisses it as "meaningless," constituting a collection of independent, unilateral, and unenforceable targets being sold as a multilateral consensus (Spash, 2016).

Compared with the mechanisms of other environmental regimes, the mechanisms for strengthening commitments are considerably less straightforward (Young, 2016). We now review the most central textual elements for fostering ambition.

6.4 | Progression and the NDC cycle

One central tool for ratcheting up ambition is the obligation to prepare successive NDCs every 5 years (Articles 4.2 and 4.9) (Friedrich, 2017). This obligation is the PA's core legal commitment on the Parties, per Brun (2016). Each party's successive NDCs "will represent a progression beyond [its previous NDC] and reflect its highest possible ambition" (Article 4.3). Both elements in Article 4.3 faced widespread opposition during negotiations (Brun, 2016) and it is unclear whether the final formulation is legally binding (see Winkler, 2017). It nevertheless creates expectations of "tremendous significance" in guiding the NDCs in an increasingly ambitious direction (Rajamani & Guerin, 2017).

6.5 | Transparency and global stocktake

Keohane and Oppenheimer (2016) argue that pledge-and-review can work only in the presence of transparency, while Winkler (2017) emphasizes that Article 4's NDC provision must be read together with links to transparency and the global stocktake, because they are crucial for providing an upward ambition spiral.

Article 13 establishes a transparency framework. Parties shall regularly report their emissions and provide information necessary to track progress in their NDC implementation and achievement. Article 13 also states reports shall be reviewed multilaterally. For Falkner (2016), these reviews are the principal tool for driving up ambition, through creating periodic moments for naming and shaming.

The transparency framework is focused on individual Parties, and will be insufficient for assessing aggregate progress (Briner & Moarif, 2016; Rajamani, 2016). Collective progress toward achieving the PA's goals will be assessed in a global stocktake every 5 years, from 2023 (Article 14). The stocktake is crucial for driving ambition, because it links individual

ambition to the collective goals, and can thus be regarded as the engine of the agreement, expected to drive political momentum (Friedrich, 2017). Notably, the stocktake's outcome "shall inform" Parties in updating and enhancing their actions. The interpretation of "inform" will be crucial for what role the stocktake will play in national processes. Friedrich (2017) argues that it must entail some kind of action by recipients.

6.6 | Outlook

Due to the discrepancy between collective goals and aggregated effects of NDCs, the PA's fate will be determined by mechanisms for ratcheting up ambition (Doelle, 2017; Young, 2016). Because the PA's approach to ratcheting up is novel, it represents a high-stakes experiment in multilateral cooperation (Doelle, 2017). Most scholars express caution when assessing the likelihood that the agreement's provisions will actually deliver sufficient ratcheting up. The hope is that they will foster "soft reciprocity," in which successfully implementing NDCs creates a positive spiral of trust and cooperation. However, the risk is that reviews might reveal implementation gaps that could create a negative spiral of weakening trust and declining ambition (Falkner, 2016). Young (2016) warns that the mechanisms for strengthening commitments seem ill defined and weak, and that efforts to remedy them could easily break down in mutual recriminations. Thus, it would not be surprising if the agreement fails. Keohane and Victor (2016) predict that without new incentives for climate action, collaboration is firmly stuck on easy coordination. Simulations of political dynamics under the PA also find that it is unlikely to endogenously deliver sufficient ambition ramp-up to achieve the 2°C goal, even under very optimistic assumptions (Sælen, 2018).

Given the primacy of domestic politics under the Paris architecture, Keohane and Victor (2016) argue that whether negotiations lead to substantial mitigation will depend less on the PA's text than on domestic politics. It is therefore noteworthy that surveys of public opinion in major emitter countries reveal surprisingly strong support for domestic emissions reductions, regardless of whether other countries reciprocate (Bernauer, Dong, McGrath, Shaymerdenova, & Zhang, 2016; Bernauer & Gampfer, 2015; McEvoy & Cherry, 2016; McGrath & Bernauer, 2017). Furthermore, according to a survey covering Australia, India, South Africa, the United Kingdom, and the United States, there is majority support for a domestic carbon tax, assuming that revenues are redistributed to citizens or earmarked for mitigation and that all other countries implement the tax (Carattini, Kallbekken, & Orlov, 2019). However, particularly in the United States, climate change remains a highly polarized issue. Bliuc et al. (2015) find that public views are best described as a sociopolitical conflict between two opposing groups with distinct social identities, and they warn that interventions that increase angry opposition to climate action are especially problematic. The recent French protests sparked by a proposed fuel tax hike indicate that climate action is now faced with a populist backlash, as many citizens see it as an elite priority (Dolsak & Prakash, 2018).

The PA's prospects will be heavily influenced by nonstate actors. Keohane and Oppenheimer (2016) argue that the PA's actual impact will depend on whether domestic groups can use it as leverage for climate action, while Bäckstrand, Kuyper, Linnér, and Lövbrand (2017) note that governments' willingness to increase ambition over time will be highly influenced by business practices, investment patterns, and climate governance initiatives at subnational levels.

7 | COMPLIANCE

Our discussion of the trilemma (Section 3) is compatible with the frequently made observation that (full) compliance is neither a necessary nor a sufficient condition for effectiveness (Mitchell, 2008; Victor, 2011). However, no agreement can be very effective unless it achieves a reasonable degree of compliance. Moreover, for any given combination of (nonzero) participation and commitment-depth levels, the better the compliance rate, the higher the agreement's effectiveness.

7.1 | Compliance in the PA context

In the PA's context, "compliance" may be defined as the action or process of (a) abiding by the agreement's procedural regulations and (b) fulfilling NDCs concerning emissions reductions (or limitations).[8] Legally binding aspects of the agreement mostly concern (a), while provisions relating to (b) are typically of a "soft" nature. It is therefore largely unsurprising that the Parties decided in favor of a managerial approach, rather than a strong mechanism for promoting implementation and compliance (Doelle, 2017, p. 376). Indeed, as Dagnet and Northrop (2017, p. 345) emphasize, "it is difficult to conceive that a Party would need to 'comply' with something that is not mandatory." Article 15.2, stating that the implementation and compliance mechanism "shall be expert-based and facilitative in nature and function in a manner that is transparent, nonadversarial, and nonpunitive," must be seen in this light.

However, Article 4.2 prescribes that Parties shall "pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions" [NDCs]. Moreover, Article 13.7 requires Parties to provide information that facilitates

tracking the progress of the implementation of their NDC. These two articles ensure that Parties are legally bound to actively pursue their NDC (Winkler, 2017, pp. 146–148).

7.2 | Current policy developments concerning compliance

Policy developments on the ground so far suggest that countries are complying with the PA's procedural regulations. Comprehensive surveys report a rapid spread of domestic policies worldwide (Dubash, Hagemann, Höhne, & Upadhyaya, 2013; World Bank, 2016). Over the last decade, policy frameworks for emission reductions have become nearly universal in their jurisdictional coverage. Today, 89% of global GHG emissions are subject to national GHG emission targets, compared to 67% in 2012 and 45% in 2007 (Iacobuta, Dubash, Upadhyaya, Deribe, & Höhne, 2018, p. 1123; Dubash et al., 2013). The biggest policy increase took place around the time of the 2015 Paris conference and in its aftermath. Preparations of NDCs have advanced domestic governmental climate policies, especially in the developing countries (Höhne et al., 2017). The number of non-Annex I countries with emission targets jumped from 1% to 69% between 2012 and 2017 (Iacobuta et al., 2018, p. 1124).

Compliance with NDCs remain more uncertain. Perhaps the most ambitious policies are being pursued in Europe. The EU pledge under the PA is to reduce GHG emissions at least 40% below 1990 levels by 2030.[9] Moreover, strengthening the already existing binding policies under a 2014 climate-and-energy policy framework,[10] the 2018 Clean Energy for All Europeans policy package aims for 32% renewables of total energy production and a 32.5% improvement in energy efficiency by 2030. The policy results achieved to date are compelling; indeed, between 1990 and 2016, EU emissions decreased by 23%, despite that GDP increased by 53%.[11]

There is, however, another side to the story that questions the PA's ability to achieve high compliance rates. First, the EU cuts have to a significant extent been achieved by countries previously under USSR control, such as Slovakia (75% increase in GDP combined with 22% CO_2 emission reductions between 2000 and 2014) and Romania (65–22) (World Resources Institute, 2017). Second, a country like Germany—a global champion of ambitious climate policy—recently gave up on its *self-imposed* target of reducing emissions 40% below 1990 levels by 2020.[12] Finally, while emissions are declining in the EU and in some other industrialized countries, they "are growing massively in the emerging economies" (Bernauer, 2013, p. 416). Thus, 2018 witnessed substantial emission growth in China, India, and even in the United States, resulting in a 2.7% global increase, the second highest in the most recent decade (e.g., see Harvey, 2018).

7.3 | Outlook

What are the future prospects concerning compliance with the PA? Barrett (2016, p. 76) predicts that the PA will more likely "change what players say than what they do." Similarly, Falkner (2016, p. 1122) cautions that the historical record is not particularly encouraging when it comes to compliance with past ambitious targets for emissions reductions. And Bang, Hovi and Skodvin (2016, p. 210) conjectures that compliance will likely be the PA's "Achilles' heel."

However, reasons for optimism are also being voiced. For example, Falkner (2016) points out that, by rooting targets in domestic politics rather than in international consent, the PA imposes a new context that could prove conducive to compliance. Likewise, Tørstad (2018) argues that the prospects for compliance are reasonably good, because the PA reflects a consensus among nations that climate change concerns all, because climate change mitigation is gradually becoming more beneficial in financial terms, and because many NDCs do not deviate radically from a BAU scenario.

Many scholars hold transparency and leadership to be crucial for achieving high NDC compliance. To promote transparency, the PA creates three formal review processes—the global stocktake (Article 14), the transparency framework (Article 13), and the implementation and compliance mechanism (Article 15). In addition, nonstate actors will likely contribute significantly to enhancing transparency (Van Asselt, 2016).[13] However, countries' NDCs differ in terms of their base year, target year, and procedures for assessing and validating progress (Young, 2016). While such differences make assessments challenging, they also reflect the overall flexibility of the pledge-and-review system, which enables countries to tailor their NDCs to match "the interests and views of domestic constituents" (Keohane & Oppenheimer, 2016, p. 146).

Nevertheless, developing NDCs and enhancing the basis for comparability and progress assessments remain high-priority concerns (Victor, 2016). Transparency is needed precisely to assist international comparison of national policies and thus to enable effective naming and shaming through expert review, peer pressure among states, and green NGOs' scrutiny domestically and internationally (Falkner, 2016, p. 1121).

In addition, transparency is also important for limiting possibilities for creative accounting. Consider developed countries' pledge under the Copenhagen Accord (and renewed in the PA) to provide at least US$100 billion yearly in climate finance to developing countries by 2020. An OECD report found that by 2014, private and public sources had already pledged as much as US$62 billion (Organisation for Economic Co-operation and Development, 2015), which would seem to indicate reasonably high compliance with this pledge. However, developing countries (notably India) seriously questioned these OECD

figures, arguing that the true amount of fresh funds at the time might have been as low as US$2.5 billion, the difference being due to "relabeling or redirection of existing official development flows" (Clémençon, 2016, p. 11).

A second important factor conducive to compliance is leadership by major emitters. The 2014 climate agreement between the world's two biggest emitters, the United States and China, arguably set an example for other countries to follow and thereby helped pave the way for broad support for the PA a year later. While a continued China–US climate partnership might have proved conducive also for ambition and compliance, this leadership suffered a severe blow when President Trump announced US withdrawal from the PA. An important question is now: Can other main actors assume leadership roles to motivate other countries to adopt ambitious NDCs and comply with them? Parker, Karlsson and Hjerpe (2015, p. 443) suggests that the world currently "lacks a single undisputed leader in the field of climate change." Indeed, according to Clémençon (2016, p. 14), even the European Union, who assumed the leader role after President Bush's repudiation of Kyoto in 2001, is currently struggling "to keep its internal momentum on climate change going in line with long-term emissions reductions objectives for 2050 and beyond."[14]

Finally, compliance levels will likely depend on technological progress (Bang, Hovi, & Skodvin, 2016). It is therefore unsurprising that the PA greatly emphasizes technology development and technology transfer (Rajamani, 2016). Technological progress beyond governments' expectations would facilitate high compliance levels. In contrast, technological progress below expectations might undermine compliance by making NDC implementation costlier than anticipated.

In sum, the literature seems to suggest that the likelihood of achieving high compliance with the PA currently remains uncertain. In particular, high compliance will likely require a high degree of transparency and comparability. It will also likely require strong leadership and fast technological progress, particularly if countries—in keeping with the PA—significantly ratchet up ambitions in their future NDCs.

8 | CONCLUSIONS

At least six main conclusions may be drawn from our review of literature on the PA:

- First, a near consensus appears to exist that the PA has the *potential* to deliver on its goals. Practitioners and scholars alike seemingly agree that the agreement is complex yet too significant to simply be dismissed as irrelevant.
- Second and perhaps unsurprisingly, inside observers are generally more optimistic about prospects for success than outside observers are. Outside observers often emphasize the PA's weaknesses and expect its implementation to encounter considerable obstacles. In contrast, insiders tend to regard the PA as a breakthrough, emphasize its strengths, and evaluate its prospects favorably.
- Third, insiders and outsiders alike acknowledge there is no guarantee the PA will eventually reach its collective temperature goals. Legal complexities and uncertainties about global and domestic socioeconomic developments make the PA's long-term impact highly contingent.
- Fourth, interactions between the PA and domestic politics will likely influence long-term ambition as well as compliance. Surveys indicate widespread general public support for climate action, but also polarization and signs of a populist backlash, including popular protest against some specific climate policy proposals.
- Fifth, the trilemma outlined in Section 4 suggests that serious reasons for skepticism exist. Because participation is expected to remain broad, the major challenge for long-term effectiveness will likely be to facilitate fast ratcheting-up of NDC ambition, while keeping compliance rates high. An essential factor will be the extent to which enthusiastic countries can inspire others to follow suit. The outcome will arguably be determined through a struggle between, on one hand, forces wanting to continue producing and consuming fossil fuels more or less as usual and, on the other hand, emerging international norms to reduce emissions, sustained by pressure from green NGOs and from fast-growing industries producing clean energy.[15]
- Finally, in terms of environmental results, developments so far are not particularly promising. First-round NDCs failed to put emissions on a path consistent with achieving the collective temperature goals (Rogelj et al., 2016; United Nations Framework Convention on Climate Change, 2015). Moreover, after 3 years at relatively constant levels, global CO_2 emission growth resumed in 2017 and accelerated in 2018. It is therefore extremely important that the PA prove able to deliver deep global emission cuts in the years to come.

CONFLICT OF INTEREST

The authors have declared no conflicts of interest for this article.

ENDNOTES

[1]The Paris outcome included not only the PA but also an accompanying decision by the Conference of the Parties. This paper focuses on the PA.

[2]It may be noticed that while the Kyoto Protocol satisfies none of these conditions, the PA satisfies at least one (broad participation).

[3]Available at https://www.nobelprize.org/prizes/economics/1999/mundell/facts/(accessed August 28, 2018).

[4]A few scholars have questioned the significance of the trade-offs inherent in the trilemma (see Bernauer, Kalbhenn, Koubi, & Spilker, 2013; Gilligan, 2004).

[5]The status of ratification is available at https://unfccc.int/process/the-paris-agreement/status-of-ratification (accessed January 14, 2019). The NDC registry is available at https://www4.unfccc.int/sites/ndcstaging/Pages/Home.aspx.

[6]In 2018, however, emissions grew substantially both in the United States and in China, as well as in India (see Harvey, 2018 for a summary).

[7]Here, a winning coalition refers to a group of states—possibly supported by nongovernmental actors—who can, by own or collaborative efforts, achieve the more ambitious goals that they have set for themselves.

[8]The latter point also includes nationally determined contributions to climate finance; however, we here focus on mitigation.

[9]European Council Conclusions, Document EUCO 169/14 (October 24, 2014).

[10]The policy package comprises eight pieces of legislation available at https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans (accessed January 10, 2019).

[11]Available at https://ec.europa.eu/clima/policies/strategies/progress_en (accessed January 11, 2019).

[12]See https://qz.com/1175308/germany-is-abandoning-its-climate-goals-for-2020-what-happens-next/ (accessed July 8, 2018).

[13]Karlsson-Vinkhuyzen et al. (2018) identify four main sources of transparency: formal review procedures; national and regional institutions; citizens and nongovernmental organizations; and governments' internal monitoring and evaluation systems.

[14]Still, the EU is currently in the process of ratcheting up its NDC from reducing emissions 40% below 1990 levels by 2030 to reducing them 45%. See http://www.climatechangenews.com/2018/06/20/eu-will-increase-pledge-paris-agreement-says-canete/ (accessed September 22, 2018).

[15]Keohane and Oppenheimer (2016) argue that countries might be motivated to reduce emissions by domestic side benefits; pressure from domestic constituencies; "specific" or "diffuse" rewards from other countries; and a desire to cultivate their international reputation.

RELATED WIREs ARTICLES

Climate justice and the international regime: Before, during, and after Paris
Envisioning REDD+ in a post-Paris era: Between evolving expectations and current practice
The Paris Agreement and the inherent inconsistency of climate policymaking
Are China's climate commitments in a post-Paris Agreement sufficiently ambitious?
Safeguarding development and limiting vulnerability: India's stakes in the Paris Agreement
The European Union and the Paris Agreement: Leader, mediator, or bystander?
Will the Paris Agreement accelerate the pace of change?
Non-state actors in hybrid global climate governance: Justice, legitimacy, and effectiveness in a post-Paris era

REFERENCES

Andresen, S. (2015). International climate negotiations: Top-down, bottom-up or a combination of both? *International Spectator*, *50*(1), 15–30.

Auld, G., & Gulbrandsen, L. H. (2013). Private regulation in global environmental governance. In R. Falkner (Ed.), *Handbook of global climate and environmental policy* (pp. 394–411). Oxford, England: Wiley-Blackwell.

Bang, G., Hovi, J., & Skodvin, T. (2016). The Paris Agreement: Short-term and long-term effectiveness. *Politics and Governance*, *4*(3), 209–218.

Barrett, S. (2008). Climate treaties and the imperative of enforcement. *Oxford Review of Economic Policy*, *24*(2), 239–258.

Barrett, S. (2016). The Paris Agreement: We can do (and have done) better. In R. N. Stavins & R. C. Stowe (Eds.), *The Paris Agreement and beyond: international climate change policy post-2020* (pp. 75–78). Cambridge, Mass: Harvard Project on Climate Agreements.

Bernauer, T. (2013). Climate change politics. *Annual Review of Political Science*, *16*(1), 421–448.

Bernauer, T., Kalbhenn, A., Koubi, V., & Spilker, G. (2013). Is there a 'depth versus participation' dilemma in international cooperation? *The Review of International Organizations*, *8*(4), 477–497.

Bernauer, T., Dong, L., McGrath, L. F., Shaymerdenova, I., & Zhang, H. (2016). Unilateral or reciprocal climate policy? Experimental evidence from China. *Politics and Governance*, *4*(3), 152–171.

Bernauer, T., & Gampfer, R. (2015). How robust is public support for unilateral climate policy? *Environmental Science & Policy*, *54*(1), 316–330.

Bliuc, A. M., McGarty, C., Thomas, E. F., Lala, G., Berndsen, M., & Misajon, R. A. (2015). Public division about climate change rooted in conflicting socio-political identities. *Nature Climate Change*, *5*, 226–229.

Bluedorn, J. C., & Bowdler, C. (2010). The empirics of international monetary transmission: Identification and the impossible trinity. *Journal of Money, Credit and Banking*, *42*(4), 679–713.

Bodansky, D. (2016). The legal character of the Paris Agreement. *Review of European, Comparative & International Environmental Law*, *25*(2), 142–150.

Bodle, R., & Oberthür, S. (2017). Legal form of the Paris Agreement and nature of its obligations. In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 75–78). Oxford, England: Oxford University Press.

Briner, G., & Moarif, S. (2016). *Unpacking provisions related to transparency of mitigation and support in the Paris Agreement. Climate Change Expert Group*. Paris, France: OECD/IEA.

Brun, A. (2016). Conference diplomacy: The making of the Paris Agreement. *Politics and Governance*, *4*(3), 115–123.

Bäckstrand, K., Kuyper, J. W., Linnér, B. O., & Lövbrand, E. (2017). Non-state actors in global climate governance: From Copenhagen to Paris and beyond. *Environmental Politics*, *26*(4), 561–579.

Carattini, S., Kallbekken, S., & Orlov, A. (2019). How to win public support for a global carbon tax. *Nature*, *565*, 289–291.

Chan, S., Falkner, R., Goldberg, M., & van Asselt, H. (2018). Effective and geographically balanced? An output-based assessment of non-state climate actions. *Climate Policy*, *18*(1), 24–35.

Clémençon, R. (2016). The two sides of the Paris Climate Agreement: Dismal failure or historic breakthrough? *Journal of Environment & Development*, *25*(1), 3–24.

Dagnet, Y., & Northrop, E. (2017). Facilitating implementation and promoting compliance (Article 15). In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 338–351). Oxford, England: Oxford University Press.

Dimitrov, R. S. (2016). The Paris Agreement on climate change: Behind closed doors. *Global Environmental Politics*, *16*(3), 1–11.

Doelle, M. (2017). Assessment of strengths and weaknesses. In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 375–388). Oxford, England: Oxford University Press.

Dolsak, N., & Prakash, A. (2018). Can the climate movement survive populism? Lessons from 'yellow vest' protests. The Hill, December 6. Retrieved from https://thehill.com/opinion/energy-environment/419953-can-the-climate-movement-survive-populism-lessons-from-yellow-vest

Dubash, N. K., Hagemann, M., Höhne, N., & Upadhyaya, P. (2013). Developments in national climate change mitigation legislation and strategy. *Climate Policy*, *13*(6), 649–664.

Falkner, R. (2016). The Paris Agreement and the new logic of international climate politics. *International Affairs*, *92*(5), 1107–1125.

Fawcett, A. A., Iyer, G. C., Clarke, L. E., Edmonds, J. A., Hultman, N. E., McJeon, H. C., … Shi, W. (2015). Can Paris pledges avert severe climate change? *Science*, *350*(6265), 1168–1169.

Friedrich, J. (2017). Global Stocktake (Article 14). In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 319–337). Oxford, England: Oxford University Press.

Fry, I. (2016). The Paris Agreement: An Insider's perspective—The role of small island developing states. *Environmental Policy and Law*, *46*(2), 105.

Gilligan, M. (2004). Is there a broader-deeper trade-off in international multilateral agreements? *International Organization*, *58*(3), 459–484.

Goodwin, P., Katavouta, A., Roussenov, V. M., Foster, G. L., Rohling, E. J., & Williams, R. G. (2018). Pathways to 1.5 °C and 2 °C warming based on observational and geological constraints. *Nature Geoscience*, *11*(2), 102–107.

Green, J. F. (2013). Order out of chaos: Public and private rules for managing carbon. *Environmental Policy and Law*, *46*(2), 105–108.

Green, J. F. (2014). *Rethinking private authority*. Princeton, NJ: Princeton University Press.

Gulbrandsen, L. H., & Auld, G. (2016). Contested accountability logics in evolving nonstate certification for fisheries sustainability. *Global Environmental Politics*, *16*(2), 42–60.

Hale, T. (2016). "All hands on deck": The Paris agreement and non-state climate action. *Global Environmental Politics*, *16*(3), 12–22.

Harvey, C. (2018). CO_2 emissions reached an all-time high in 2018, Scientific American. Retrieved from https://www.scientificamerican.com/article/co2-emissions-reached-an-all-time-high-in-2018/

Higham, A. (2017). Epilogue: Making the transition from an international agreement to a new epoch of human prosperity in one generation. In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 413–416). Oxford, England: Oxford University Press.

Höhne, N., Kuramochi, T., Warnecke, C., Röser, F., Fekete, H., Hagemann, M., … Gonzales, S. (2017). The Paris Agreement: Resolving the inconsistency between global goals and national contributions. *Climate Policy*, *17*(1), 16–32.

Iacobuta, G., Dubash, N. K., Upadhyaya, P., Deribe, M., & Höhne, N. (2018). National climate change mitigation legislation, strategy and targets: A global update. *Climate Policy*, *18*(9), 1114–1132.

Intergovernmental Panel on Climate Change. (2014). Climate change 2013: The physical science basis. Retrieved from https://data.globalchange.gov/report/ipcc-ar5-wg1

Karlsson-Vinkhuyzen, S. I., Groff, M., Tamás, P. A., Dahl, A. L., Harder, M., & Hassall, G. (2018). Entry into force and then? The Paris Agreement and state accountability. *Climate Policy*, *18*(5), 593–599.

Keohane, R. O., & Oppenheimer, M. (2016). Paris: Beyond the climate dead end through pledge and review? *Politics and Governance*, *4*(3), 142–151.

Keohane, R. O., & Victor, D. G. (2016). Cooperation and discord in global climate policy. *Nature Climate Change*, *6*, 570–575.

Kinley, R. (2017). Climate change after Paris: From turning point to transformation. *Climate Policy*, *17*(1), 9–15.

Klein, D. R., Carazo, M. P., Doelle, M., Bulmer, J., & Higham, A. (Eds.). (2017). *The Paris Agreement on climate change: Analysis and commentary*. Oxford, England: Oxford University Press.

Krugman, P. (1999). O Canada. A neglected nation gets its Nobel. Retrieved from http://www.slate.com/articles/business/the_dismal_science/1999/10/o_canada.html?via=gdpr-consent

Mace, M., & Verheyen, R. (2016). Loss, damage and responsibility after COP 21: All options open for the Paris Agreement. *Review of European, Comparative & International Environmental Law*, *25*(2), 197–214.

Mattoo, A., & Subramanian, A. (2012). Equity in climate change: An analytical review. *World Development*, *40*(6), 1083–1097.

McEvoy, D. M., & Cherry, T. L. (2016). The prospects for Paris: Behavioral insights into unconditional cooperation on climate change, Palgrave Communications, 2: Article 16056.

McGrath, L. F., & Bernauer, T. (2017). How strong is public support for unilateral climate policy and what drives it? *WIREs Climate Change*, *8*(6), e484.

Michaelowa, K., & Michaelowa, A. (2017). Transnational climate governance initiatives: Designed for effective climate change mitigation? *International Interactions*, *43*(1), 129–155.

Millar, R. J., Fuglestvedt, J. S., Friedlingstein, P., Rogelj, J., Grubb, M. J., Matthews, H. D., … Allen, M. R. (2017). Emission budgets and pathways consistent with limiting warming to 1.5 C. *Nature Geoscience*, *10*(10), 741–747.

Mitchell, R. B. (2008). Compliance theory: Compliance, effectiveness, and behaviour change in international environmental law. In D. Bodansky, J. Brunnée, E. Hey, & R. B. Mitchell (Eds.), *The Oxford handbook of international environmental law* (pp. 894–923). Oxford, England: Oxford University Press.

Müller, B., Höhne, N., & Ellermann, C. (2009). Differentiating (historical responsibility for climate change). *Climate Policy*, *9*(6), 593–611.

Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2004). Monetary sovereignty, exchange rates, and capital controls: The trilemma in the interwar period. *IMF Staff Papers*, *51*, 75–108.

Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2005). The trilemma in history: Tradeoffs among exchange rates, monetary policies, and capital mobility. *Review of Economics and Statistics*, *87*(3), 423–438.

Obstfeld, M., Shambaugh, J. C., & Taylor, A. M. (2010). Financial stability, the trilemma, and international reserves. *American Economic Journal: Macroeconomics*, *2*(2), 57–94.

Organisation for Economic Co-operation and Development. (2015). Climate financing momentum builds. Retrieved from http://www.oecd.org/environment/climate-financing-momentum-builds.htm

Parker, C. F., Karlsson, C., & Hjerpe, M. (2015). Climate change leaders and followers: Leadership recognition and selection in the UNFCCC negotiations. *International Relations*, *29*(4), 434–454.

Pew Research Center. (2016). Retrieved from http://www.pewinternet.org/2016/10/04/public-views-on-climate-change-and-climate-scientists/

Raftery, A. E., Zimmer, A., Frierson, D. M., Startz, R., & Liu, P. (2017). Less than 2°C warming by 2100 unlikely. *Nature Climate Change*, *7*(9), 637–641.

Rajamani, L. (2016). Ambition and differentiation in the 2015 Paris Agreement: Interpretative possibilities and underlying politics. *International and Comparative Law Quarterly*, *65*(2), 493–514.

Rajamani, L., & Guerin, E. (2017). Central concepts in the Paris Agreement and how they evolved. In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 74–90). Oxford, England: Oxford University Press.

Rogelj, J., Den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., … Meinshausen, M. (2016). Paris Agreement climate proposals need a boost to keep warming well below 2°C. *Nature*, *534*(7609), 631–639.

Rokkan, S. (1966). Numerical democracy and corporate pluralism. In R. A. Dahl (Ed.), *Political opposition in western democracies*. New Haven, CT: Yale University Press.

Spash, C. L. (2016). This changes nothing: The Paris Agreement to ignore reality. *Globalizations*, *13*(6), 928–933.

Sælen, H. (2018). *Under what conditions will the Paris process produce a cycle of increasing ambition sufficient to reach the 2°C goal?* (Working paper 1/2018). Oslo, Norway: CICERO.

Tørstad, V. (2018). Evaluating the effectiveness of the Paris Agreement: An integrative approach. SSRN Electronic Journal. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3204273

Underdal, A., & Wei, T. (2015). Distributive fairness: A mutual recognition approach. *Environmental Science & Policy*, *51*(1), 35–44.

United Nations Framework Convention on Climate Change. (2015). Adoption of the Paris Agreement. Retrieved from http://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf

Van Asselt, H. (2016). The role of non-state actors in reviewing ambition, implementation, and compliance under the Paris Agreement. *Climate Law*, *6*(1–2), 91–108.

Victor, D. G. (2011). *Global warming gridlock. Creating more effective strategies for protecting the planet*. Cambridge, England: Cambridge University Press.

Victor, D. G. (2016). Making the promise of Paris a reality. In R. N. Stavins & R. C. Stowe (Eds.), *The Paris Agreement and beyond: International climate policy post-2020*. Cambridge, MA: Harvard Project on Climate Agreements.

Victor, D. G. (2017). Order from Chaos: America exits the climate stage. Retrieved from https://www.brookings.edu/blog/order-from-chaos/2017/06/01/america-exits-the-climate-stage/

Winkler, H. (2017). Mitigation (Article 4). In D. R. Klein, M. P. Carazo, M. Doelle, J. Bulmer, & A. Higham (Eds.), *The Paris Agreement on climate change. Analysis and commentary* (pp. 141–166). Oxford, England: Oxford University Press.

World Bank. (2016). *State and trends of carbon pricing*. Washington, DC: World Bank.

World Resources Institute. (2017). *This interactive chart explains world's top 10 emitters, and how they've changed.* Retrieved from https://www.wri.org/blog/2017/04/interactive-chart-explains-worlds-top-10-emitters-and-how-theyve-changed

Young, O. R. (2016). The Paris Agreement: Destined to succeed or doomed to fail? *Politics and Governance*, *4*(3), 124–132.

How to cite this article: Dimitrov R, Hovi J, Sprinz DF, Sælen H, Underdal A. Institutional and environmental effectiveness: Will the Paris Agreement work? *WIREs Clim Change*. 2019;10:e583. https://doi.org/10.1002/wcc.583