



**“This time is different”:  
The prospects for an effective climate  
agreement in Paris 2015**

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## Executive Summary

The international climate change conference occurring in Paris at the end of 2015 presents an important opportunity for governments to negotiate a new international climate agreement. A question of central importance to negotiators and observers is: what kind of *policy architecture* — what policy, legal and institutional structure — is likely to be most effective in generating sufficient emissions reductions to restrain global climate change to within relatively safe levels?

Some important insights inform the answer to this question:

- As there is no world government, states can choose whether or not to participate in, and be legally bound by, international treaties (and whether or not to continue participating);
- International cooperation can helpfully change states' incentives to reduce emissions, coordinate policies and expectations, collect and diffuse helpful information, and foster new norms;
- However, domestic (political, economic, technical and other) factors arguably have a much greater influence on countries' climate policies than international cooperation;
- A highly centralised, relatively binding policy architecture (like that in the Kyoto Protocol) has the theoretical advantage of increasing the likelihood that the countries that choose to participate will meet their commitments, but arguably this effect is modest and outweighed by a bigger, negative effect — namely that strongly binding agreements can preclude the participation or depress the ambition of large, systemically important emitters, particularly the United States and China;
- In any case, when the full costs and benefits of mitigation actions are considered, a strongly binding and centralised architecture no longer appears to be the best approach for every sector and every aspect of mitigation:
  - A large pool of emissions in most countries could be reduced in ways that would bring relatively certain local net-benefits, thanks to the declining costs of many low/zero-carbon substitutes and the co-benefits, such as cleaner air, they tend to bring (with many of these benefits accruing in the short- to medium-term and enduring) — but international cooperation could help to reduce political and technical barriers to the realisation of these emissions reductions;
  - A significant pool of emissions reductions would become locally net-beneficial over the medium- to long-term through investments in low/zero-carbon innovation (which would also likely bring wider economic benefits) — but international cooperation could help to overcome the partly-global-public-good character of innovation, and to increase its effectiveness through coordination;
  - A further pool of mitigation options would remain locally net-costly — but these are likely to be concentrated in particular sectors, so international cooperation could be better targeted sectorally.

The emerging policy architecture for agreement in Paris 2015 suggests that negotiators and key observers have heeded a number of these insights. Importantly, states' emissions reduction contributions will be "nationally-determined", and are unlikely to be legally binding under international law. This is likely to enable the participation, and increase the ambition, of the largest, systemically important emitters, including China and the United States, and therefore increase the collective ambition across all countries. The credibility of these nationally-determined contributions can be enhanced by a greater focus at the international level on their implementation into states' domestic laws and policies, and on mechanisms to promote the transparent measurement, reporting and verification of their fulfilment.

Whatever the architecture agreed upon, the level of ambition ultimately embodied in states' emissions reduction contributions in Paris will almost certainly be insufficient to avoid high risks of grave climate change impacts. However, the Paris agreement is likely to incorporate mechanisms to facilitate the increasing ambition of states over time — and we can reasonably expect such increasing ambition, given continued favourable changes in technology, relative prices, and politics. These dynamic elements of the Paris architecture will be critical to the effectiveness of the agreement over the long term.

Primarily for the above reasons, the Paris conference, and anticipated agreement, looks set to be desirably different from past major climate conferences/agreements.

There remains, however, considerable scope for effective international climate cooperation that extends well beyond what seems likely to be included in the main Paris agreement. In particular, narrower coalitions of countries could achieve deeper gains by cooperating in particular sectoral, technology or policy areas. Such coalitions could usefully articulate a medium-term goal of decarbonising the global electricity sector before 2050, and could work to achieve it by agreeing to phase-out the consumption and production of coal, and to scale-up and better coordinate low/zero-carbon energy innovation. These cooperative measures could be integrated into the formal UN process in various ways, but in the near term they may need to be advanced by willing countries (in Paris or otherwise) 'on the side' of the formal negotiations.

Ultimately, international cooperation can at best accelerate countries' domestic transition to a zero-carbon economy. Each country and its citizens must find its own way to achieve a deep, timely and just transition. Paris 2015 looks like it will help. But the hardest work will remain to be done.

## Contents

Executive Summary .....	4
1. Introduction.....	7
a) What the Paris conference is about.....	7
b) What this paper is about.....	8
2. International Climate Cooperation: Who, Why and How? .....	9
a) Who? States and the nature of public international law .....	9
b) Why? Incentives, coordination, knowledge and norms .....	9
c) How? The role of ‘policy architectures’ .....	11
i) Policy Structure.....	11
ii) Centralisation.....	11
iii) Bindingness.....	12
iv) Evaluating architectures .....	13
3. Two key considerations for designing an effective international policy architecture .....	14
a) The interplay between international architecture and domestic factors.....	14
i) The interplay between international bindingness and domestic ambition and credibility .....	15
ii) The interplay between policy structure and ambition.....	18
b) The costs and benefits of action.....	19
i) Local co-benefits.....	20
ii) Dynamic innovation effects.....	21
iii) Residual, locally net-costly mitigation .....	22
4. The emerging policy architecture for an agreement in Paris 2015 and its likely effectiveness .....	22
a) “Intended nationally-determined contributions” .....	23
b) The form of commitments: promoting credibility and coordination .....	23
c) Transparency, review and participation .....	24
d) (Upward) revision of commitments .....	25
e) A long-term goal.....	26
f) Finance, Technology and Capacity-Building .....	27
5. Beyond the Paris Agreement: Additional international initiatives and a just domestic transition .....	27
a) International initiatives for ‘narrower and deeper’ cooperation .....	27
i) A medium-term goal for electricity sector decarbonisation.....	28
ii) Phasing out coal .....	29
iii) Zero carbon energy innovation .....	30
b) Domestic implications of a more decentralised international architecture: A just transition .....	30
6. Conclusion.....	31
Bibliography .....	33

## 1. Introduction

### a) What the Paris conference is about

From 30 November to 11 December 2015, representatives of 195 national governments and tens of thousands of civil society observers will descend on Paris, France for the innocuous-sounding, but highly important, 21<sup>st</sup> Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC).<sup>1</sup> It is widely hoped that this will be the conference at which a new international agreement is negotiated setting out how countries will cooperate to tackle climate change.

The science of climate change is clear: without urgent action to curb the increasing flows of greenhouse gas emissions and then reduce them rapidly over the coming few decades, it is highly unlikely that greenhouse gas concentrations will stabilise at a level to which most countries and natural systems could adapt safely.<sup>2</sup> In essence, the purpose of the Paris conference is to agree on a set of principles, rules, measures and institutions equitably to reduce emissions (mitigation) and adapt to expected climate change (adaptation), with a particular emphasis on the actions to be taken, and outcomes to be achieved, after 2020. The provision of international support for finance, technology and capacity building (FTCB), which relates to both mitigation and adaptation, will be another important aspect of the negotiations.

The formal negotiations within the UNFCCC will involve large plenary sessions and many smaller meetings, carried out within the institutions of the UNFCCC.<sup>3</sup> In these meetings, government negotiators — often negotiating in blocs defined by shared interests or priorities<sup>4</sup> — will negotiate the language of proposed decisions and agreements. The negotiations will be conducted according to the convention that all decisions be made by consensus (this effectively means that every country has the power to veto any decision).<sup>5</sup>

But the Paris conference is about more than the UNFCCC. Much action will occur ‘on the side’ of the formal negotiations. This will include less formal meetings between smaller groups of countries, some of whom may make additional announcements about initiatives for international climate cooperation beyond the UNFCCC. Non-state actors — including sub-national governments, businesses and industry, researchers, environmental non-government organisations (NGOs), trade unions and other civil society groups — will also play a significant role throughout the conference. In the formal negotiations, a number of such groups have official status, affording them the opportunity to attend and make pre-agreed interventions in plenary sessions with a view to influencing the substantive negotiations. They will also lobby negotiators ahead and on the side of the negotiations.

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<sup>1</sup> The UNFCCC was the first international climate change treaty. It was agreed at the Rio Earth Summit in 1992 and entered into force in 1995. Somewhat confusingly, ‘UNFCCC’ can refer to the Convention (i.e. the treaty) or to the processes and institutions established by or under the Convention. The intended meaning is usually clear from the context.

<sup>2</sup> See IPCC (2013, 2014b).

<sup>3</sup> See UNFCCC Secretariat (2014a).

<sup>4</sup> See UNFCCC Secretariat (2014b).

<sup>5</sup> The UNFCCC operates under “provisional rules of procedure”, which have never been formally adopted due to disagreements about the rules. By default, a consensus principle has been applied to decision-making.

## b) What this paper is about

How can countries best structure their cooperative interactions to promote the effective mitigation of climate change, in line with the objective of stabilising atmospheric greenhouse gas concentrations at relatively safe levels? Or, in the jargon of international relations, how can the international climate change ‘policy architecture’ be most ‘effective’ (in regard to mitigation)?<sup>6</sup> This issue will be front and centre in Paris. Specifically, participants will need to consider: the appropriate legal form of a new climate agreement (a formal legal agreement, or a mere political agreement) and the ‘bindingness’ of the particular provisions within it; the institutional arrangements the agreement adopts (e.g. for monitoring and enforcing compliance); the policy structure it adopts (focusing on ‘ends’ or ‘means’, the role of FTCB etc.). And they will need to consider how these various elements affect the ambition and credibility of countries’ commitments.

The purpose of this paper is twofold: (i) to provide a theoretical framework for analysing international climate policy architectures and their effectiveness, covering each of these elements and issues, drawing on the relevant academic literature; and (ii) to apply insights from this discussion to the anticipated policy architecture of the Paris 2015 agreement (which is emerging in the ongoing negotiations leading up to Paris) and suggest additional cooperative actions that could be taken. The paper argues that the emerging architecture for Paris is, if agreed, likely to be relatively effective, at least compared with the architectures of previous UN climate agreements. However, the paper will also argue that there are further areas in which international climate cooperation could be effective, which are less likely to be captured in the main agreement in Paris.

The paper is structured as follows. Part 2 begins with first principles, providing a basic introduction to the fundamental concepts in international relations and international law as relevant to international cooperation on climate change, including the concept of a ‘policy architecture’ and how it can be evaluated. Part 3 discusses two key considerations for designing an effective climate policy architecture: the interplay between various architectural elements and domestic factors; and the costs and benefits of mitigation actions. These considerations provide an important counterpoint to the oft-cited claim that, to be effective, international climate cooperation must take the form of a “legally binding treaty”.

The second half of the paper applies the insights from Parts 2 and 3 to draw conclusions about the effectiveness of potential international policy architectures. Part 4 analyses the key mitigation-related elements of the emerging policy architecture for agreement in Paris and suggests some ways in which these elements could be made more effective. Part 5 looks beyond the main Paris agreement: first, to consider some additional, potentially effective, international cooperative initiatives that could be advanced ‘on the side’ of the Paris negotiations that could improve the effectiveness of international cooperation; and second, to highlight the primary importance of a deep and just transition to a zero carbon economy *within* countries, which is the corollary of having a less centralised international architecture at the UN level. Part 6 concludes.

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<sup>6</sup> Of course, the Paris conference will cover a great deal many more issues than mitigation (most notably, it will cover adaptation), and the Paris outcome should be judged not only by its likely effectiveness, but also by the *fairness* and *efficiency* of the outcome. However, in a paper of this size, it is not possible to cover all of these issues.

## 2. International Climate Cooperation: Who, Why and How?

This section provides a brief overview of some relevant concepts in international relations and international law. This discussion, covering actors, their reasons for cooperation, and the role of policy architectures in effecting cooperation, provides critical background for the paper's subsequent analysis and argument. For example, one cannot evaluate an argument for the Paris agreement to be "legally binding" without some understanding of what this means in the context of the unusual legal system that exists at the international level, and without considering the specific purpose of the desired international cooperation.

### a) Who? States and the nature of public international law

The most fundamental feature of international relations is that there is no 'world government'. There is no single legal entity with authority to make global policy; no global parliament to pass global legislation; no global executive to implement and administer the law; and no global court system to interpret and enforce the law. Rather, the primary actors<sup>7</sup> on the international stage are states.<sup>8</sup>

The system of law known as public international law to some extent regulates the conduct of states, but the absence of world government means it is a fundamentally different system of law from the domestic legal systems of states like the United Kingdom. Since there is no world government, public international law is the outcome of the voluntary cooperative actions of states — most importantly, through *treaties* or other international legal agreements.<sup>9</sup> States can thus create international climate change 'law' (of a kind) and institutions, but their participation in such laws and institutions is ultimately voluntary, and therefore dependant on ongoing mutual cooperation among states.<sup>10</sup> This reality has important implications for the design of international institutions and agreements for responding to climate change.

### b) Why? Incentives, coordination, knowledge and norms

Reasons why states might wish to cooperate on climate change can be classified as follows (the four reasons discussed here are not mutually exclusive, but emphasise different potential motivations):

1. *Incentives* — From an economic perspective, climate change can be characterised as a 'global collective action problem'.<sup>11</sup> Wherever greenhouse gas emissions are produced, they mix globally in the atmosphere; thus, where actions in one country reduce emissions, the climate benefits (i.e. reduced climate risks/impacts) accrue globally.<sup>12</sup> States (or individuals or firms) that

<sup>7</sup> As the world has globalised, non-state actors have become increasingly prominent on the international stage (see, e.g., Mathews 1997; Slaughter 2004), including with regard to climate change (see, e.g., Newell 2006). However, there are challenges associated with bringing non-state actors within the state-centric system of public international law (see, e.g., Green 2008). This paper focuses on international (state-state) cooperation.

<sup>8</sup> In the parlance of international relations and international law, the term 'state' is used to refer to what we would, in plain English, refer to as 'countries'. These terms are used interchangeably throughout this paper. References to states in this paper are intended to include the European Union in its capacity as a UNFCCC member where applicable.

<sup>9</sup> A second primary source of international law is so-called 'customary international law', which evolves from the widespread practices of states: see, e.g., Brownlie (2008, ch 1.3).

<sup>10</sup> See IPCC (2014a, p 17).

<sup>11</sup> IPCC (2014a, pp 8–9). Clearly, climate change is a *global* problem. However, the framing of climate change as a global *collective action* problem, or at least as *one single* global collective action problem, is theoretically contestable, even if it is widely accepted as such. Some reasons for possible contestation are discussed in Part 3(b), below.

<sup>12</sup> IPCC (2014a, pp 8–9).

take action will therefore not be able to appropriate the full benefits of those actions — and in many cases, those actions will also incur private costs. This creates incentives for states (and individuals and firms) to underinvest in emissions reduction measures, and potentially to ‘free-ride’ on the actions of others.<sup>13</sup> International cooperation can help to change these incentives so that individual countries invest more in mitigation (or free-ride less) than they otherwise would.<sup>14</sup>

2. *Coordination* — Through international cooperation, states can coordinate their responses to climate change. They can agree on goals, principles, rules, institutions, policies, measures, targets and so on, and can allocate responsibilities among one another. Such coordination can improve the effectiveness and efficiency<sup>15</sup> of climate policy by generating clearer global signals about future policy, reducing opportunities for international ‘leakage’ of production from one jurisdiction to another, and lowering transaction costs.<sup>16</sup> Such coordination can also improve the distributional incidence of costs and benefits, through allocating entitlements and responsibilities internationally in accordance with ethical principles.<sup>17</sup> And it can facilitate the provision of assistance to countries that need it — notably FTCB support.
3. *Knowledge* — International climate cooperation can have epistemic benefits. Through international cooperation, states can collect and aggregate information from disparate sources — for example, regarding climate science, emissions sources, mitigation actions and their effectiveness etc. — and can facilitate its diffusion among governments and non-state actors.<sup>18</sup> And they can gain knowledge and experience through cooperative interactions. Enhanced knowledge, in turn, can help to improve the performance of future policy (e.g. through a process of experimentation and “social learning”),<sup>19</sup> change the interests of relevant actors,<sup>20</sup> build trust among states,<sup>21</sup> and empower domestic actors.<sup>22</sup>
4. *Norms* — international climate cooperation can lead to the evolution of widely-shared international standards, principles or rules (i.e. ‘norms’) that

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<sup>13</sup> However, whether free-riding actually occurs depends on many things, including the specific cost-benefit profile (including co-benefits) for any particular action (as to which, see Part 3(b)), and the motivations of the actor.

<sup>14</sup> Including, at least in theory, by the cooperative development of mechanisms to “internalise” the costs of emitting greenhouse gases into market prices, and/or by establishing legal rules, backed by sanctions, which incentivise compliance: see IPCC (2014a, p 9).

<sup>15</sup> That is, it can have economic advantages in the form of increased overall social benefits and/or reduced costs relative to uncoordinated action. Economists refer to two kinds of efficiency in this context: “maximising global net benefits”; and the notion of “cost-effectiveness”, which “allows for policies with the same level of performance in terms of aggregate benefits to be compared on the dimension of aggregate cost” (IPCC 2014a, p 10).

<sup>16</sup> IPCC (2014a, ch 13.3.3); GCEC (2014, pp 278–280).

<sup>17</sup> In economics, and in the parlance of international climate negotiations, such principles are often framed within the rubric of “equity”, which “emphasizes distributive justice across and within countries and across and within generations” (IPCC 2014, p 10).

<sup>18</sup> Meyer (2013); Dai (2010); Haas et al. (1993).

<sup>19</sup> IPCC (2014a, p 74); Ostrom (2009, 2010); Meyer (2013). See also Hafner-Burton et al. (2012, p 87) and sources there cited for a discussion of the epistemic benefits of international cooperation generally.

<sup>20</sup> Haas et al. (1993).

<sup>21</sup> See Bell et al. (2013), Haas et al. (1993) and Keohane (1984, 1989) on how cooperative institutions can provide states with information about one another’s performance, on which they can build mutual trust (and so facilitate deeper cooperation).

<sup>22</sup> Dai (2010); Haas et al. (1993).

can affect the behaviour of state and non-state actors.<sup>23</sup> Norms influence state behaviour by signalling standards of appropriate behaviour, reflecting the expectations of others, which create social pressures to conform and provide a benchmark for judgement (by other states and by non-state actors).<sup>24</sup> Norms can be, but need not be, legally binding. In the context of international relations, where enforcement and sanction mechanisms of international law are generally much weaker than under domestic legal systems, the distinction between legally-binding and mere political norms is, in practice, not so clear cut — international law derives much of its effect from its ‘normative power’, just as political norms do.<sup>25</sup>

### c) How? The role of ‘policy architectures’

While there are many reasons for cooperating internationally on climate change, the absence of world government means states must choose *how* they cooperate. In the literature on international climate cooperation, which mostly focuses on multilateral cooperation (i.e. between many states), this is typically treated as the question of the appropriate international *policy architecture*.<sup>26</sup> Policy architecture refers to “the basic nature and structure of an international agreement or other multilateral (or bilateral) climate regime”.<sup>27</sup>

A wide variety of climate architectures has been proposed.<sup>28</sup> They can usefully be classified along three dimensions: policy structure; centralisation of authority; and legal bindingness.

#### i) Policy Structure

One important feature of a policy architecture is its policy structure, which can be thought of as the way policy commitments are framed. For example, a policy structure might focus on the *ends* to be achieved, such as the ultimate goals of cooperation and the output targets to be achieved,<sup>29</sup> and/or it could focus on the *means* of reducing emissions, for example carbon taxation, emissions trading, technology innovation policies, financial assistance, and so on.<sup>30</sup> Other relevant aspects of the policy structure include the timeframes over which commitments are to be met, the rules and processes for monitoring/measuring, reporting and verifying (MRV) compliance, and the equitable principles by which responsibilities and entitlements are allocated.

#### ii) Centralisation

Another way to differentiate international climate policy architectures is in the extent to which they confer authority on a central institution to administer, interpret and/or

<sup>23</sup> See Bodansky (2010, ch 5) for a good discussion of international environmental norms.

<sup>24</sup> Haas et al. (1993); Hafner-Burton et al. (2012, p 54). On the role of norms in influencing state behaviour by empowering non-state actors, see Dai (2010).

<sup>25</sup> The relationship between international norms and international law has to some extent been discussed in the literature on “hard” norms/law vs “soft” norms/law. See, e.g., Baxter (1980); Abbott et al. (2000); Abbott and Snidal (2000); Bodansky (2010); Guzman and Meyer (2010); Shelton (2006); Bodansky (2010).

<sup>26</sup> See, e.g., IPCC (2014a, ch 13.4).

<sup>27</sup> Aldy and Stavins (2010). See also Schmalensee (2010).

<sup>28</sup> See, e.g., Aldy and Stavins (2010).

<sup>29</sup> Goals are “long-term and systemic” whereas targets, which may or may not flow logically from the goals, are “near-term and specific” (IPCC 2014a, p 27). Targets can be classified according to whether they require absolute emissions cuts relative to a historical baseline, or reductions relative to economic output (emissions intensity targets) or to business-as-usual projections (IPCC 2014a, p 27).

<sup>30</sup> IPCC (2014a, pp 27–29).

enforce the rules and processes to which states agree.<sup>31</sup> Strongly centralised architectures confer a high degree of authority on institutions, for example giving them the power to interpret rules, settle disputes and enforce the outcome (as with the World Trade Organisation Dispute Settlement Body). A more moderate degree of centralisation might involve conferring authority on central institutions with regard to less intrusive functions, such as coordinating negotiations, gathering and disseminating information, providing advice and technical assistance, facilitating financial and technology transfers, and perhaps facilitating the MRV (but not enforcement) of compliance. Still more decentralised architectures might involve agreements by states to coordinate their policies, or directly link them (e.g. through regional scheme linkages between emissions trading schemes), but with little or no centralisation of authority.<sup>32</sup>

### iii) Bindingness

A third differentiating feature, is the international legal 'bindingness' of the architecture. This is an area about which there is much conceptual confusion among non-experts, and as such it merits careful examination.

There are two senses in which one can talk about the bindingness of an agreement: an absolute sense (binding or not?) and a relative sense (how binding?).

First, one must consider whether an agreement is a legal agreement (in an absolute sense).<sup>33</sup> Only legal agreements (such as treaties) can bind states, but not all written agreements concluded between states are legal agreements. Whether an agreement, as a whole, is a legal agreement or not depends on the intention of the states that negotiated it, which will usually be discernible from the text of the agreement itself.<sup>34</sup> Legal agreements are thought to evince a higher degree of seriousness on the part of the contracting parties compared with mere political (non-legal) agreements.<sup>35</sup>

International legal agreements are, however, only legally binding on those states that *consent* to be bound by them (the absence of world government means that participation in international legal agreements is voluntary).<sup>36</sup> Typically for multilateral treaties, consent is given via a two-stage process. Once the text of a new treaty is agreed (e.g. as a result of negotiations at an international conference), it will be 'opened for signature'. When a state *signs* the treaty (the first stage) it indicates its intention to be bound by the treaty, but it is not yet actually bound.<sup>37</sup> States must ratify a treaty<sup>38</sup> (the second stage) in order to be bound by it.<sup>39</sup> A state is thus only

<sup>31</sup> See IPCC (2014a, ch 13.4.1).

<sup>32</sup> See IPCC (2014a, ch 13.4.1).

<sup>33</sup> Norms of customary international law can also become legally binding. However, I leave that complication aside here and focus exclusively on agreements.

<sup>34</sup> See Brownlie (2008, p 609).

<sup>35</sup> See Rausitala (2005, p 502).

<sup>36</sup> See Brownlie (2008, ch 27).

<sup>37</sup> In the case of a treaty that requires ratification as a prerequisite for the state to become bound by it, signature of the treaty merely imposes an obligation on the state to refrain from acts which would defeat the object and purpose of the treaty: see *Vienna Convention on the Law of Treaties*, art 12.

<sup>38</sup> Typically, this means an authorised member of the executive government of the state must deposit a signed "instrument of ratification" (a specially designated document) with the treaty depositary. See Brownlie (2008) and the *Vienna Convention on the Law of Treaties* arts 11, 14 and 16. Different states have different internal procedures for generating the authorisation required for ratification, as explained below.

<sup>39</sup> Typically a treaty will only enter into force (and thus become binding on the states that have ratified it) when a certain number of states have ratified it.

bound by the terms of a treaty that it has ratified.<sup>40</sup> Moreover, since participation is voluntary, states are typically lawfully entitled to withdraw from international agreements to which they are party, as Canada has done under the Kyoto Protocol.<sup>41</sup>

Second, we can consider bindingness in a relative sense. In practice, different provisions of an international agreement can be binding to differing degrees. The degree of bindingness is a function of four factors:<sup>42</sup>

1. The type of legal instrument, e.g., treaty, or protocol to a treaty;<sup>43</sup>
2. Whether the provision of the treaty (or other instrument) is expressed in mandatory language (e.g., 'shall' or 'must' vs. 'should' or 'aim');
3. The specificity with which the obligation is expressed, i.e. whether it is expressed in sufficient detail to accurately assess compliance; and
4. The enforceability of the obligation, i.e. whether the treaty contains enforcement procedures, mechanisms, sanctions and so on; the stringency and credibility of those mechanisms; and whether non-compliance with the provision in question is subject to those mechanisms.

It can readily be seen how questions of bindingness and centralisation are related: for a treaty provision to be strongly binding (i.e. encompassing (4)), a high degree of central institutional authority would be required. Accordingly, remaining discussions in this paper will typically consider bindingness and centralisation together.

The implications of having diverse factors influence the degree of bindingness are summarised by the IPCC:<sup>44</sup>

Across types of agreements, commitments may be more or less legally binding; for example, although treaties often contain mandatory commitments, a treaty may also contain hortatory provisions, such as aims and pledges, which are understood to be aspirational; while a political declaration may nonetheless contain provisions that raise strong expectations and consequences for failure (Raustiala, 2005). Some commitments may be specific and subject to monitoring and accountability, while others are vague and difficult to verify (Abbott and Snidal, 2000). Further, across types of agreements, the enforcement mechanism may be weak or rigorous, ranging from inaction to admonishments to trade sanctions to military force.

Because agreement participation is voluntary and the question of bindingness so complex and nuanced, the common claim that an international climate agreement should be "legally binding", without elaboration, is not a very meaningful or helpful one.

#### iv) Evaluating architectures

There are various criteria by which one could evaluate a particular policy architecture.<sup>45</sup> I will be focusing on one such criterion: *effectiveness*, i.e. the extent to

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<sup>40</sup> And which has entered into force (see previous footnote).

<sup>41</sup> Often, an agreement will itself contain a clause relating to withdrawal. See, e.g., article 27 of the Kyoto Protocol. The Kyoto Protocol to the UNFCCC was negotiated in 1997 and entered into force in 2005.

<sup>42</sup> IPCC (2014a, p 24); Werksman (2010).

<sup>43</sup> Treaties and protocols to treaties are, as a whole, legally binding in the absolute sense discussed above, with protocols typically being considered "more" binding. On the other hand, mere political declarations, political agreements, and (typically) resolutions and decisions of international organisations (including decision of the UNFCCC Conference of the Parties) are not legally binding in the absolute sense.

<sup>44</sup> (2014a, pp 24–25).

<sup>45</sup> IPCC (2014a, ch 13.2.2).

which the architecture achieves its objective to reduce the causes and impacts of climate change.<sup>46</sup>

When evaluating effectiveness *ex ante*, we are concerned with how *likely* it is that a particular architecture will achieve its objective to reduce the causes and impacts of climate change. This can usefully be analysed by considering the effect of the architecture on:<sup>47</sup>

- *Ambition* — individually, ambition refers to the level or stringency of a state's commitment, i.e. the extent to which it contributes to the global mitigation effort;<sup>48</sup> the collective ambition is the aggregate of countries' individual commitments (which ultimately determines the climatic outcome);
- *Credibility* — the perceived likelihood of individual states' commitments being implemented.

### 3. Two key considerations for designing an effective international policy architecture

This section of the paper considers two sets of issues that are of central importance in designing an effective climate policy architecture. Where relevant, examples will be given from historical international climate negotiations and agreements (especially the Kyoto Protocol). This discussion provides important analytical background to the argument in Part 4 regarding the policy architecture for the main agreement in Paris 2015, and for international cooperation more generally.

#### a) The interplay between international architecture and domestic factors

International agreements are negotiated voluntarily by states, and states are represented by governments who have diverse interests and face diverse internal pressures. Domestic factors — the values of the political party in government, economic considerations, business and other elite preferences, public opinion etc. — typically have a strong influence over states' positions during international climate negotiations, as well as over the implementation of international agreements (and over the development of domestic climate policy generally); arguably a much stronger influence than international factors.<sup>49</sup>

Moreover, many of the entities that have direct control over emissions-causing processes (factories, cars etc.) are individuals and firms rather than states themselves.<sup>50</sup> Since only states have relevant jurisdiction over individuals and firms, the effectiveness of international climate cooperation depends strongly on the willingness and ability of governments to develop climate policies and pass laws that implement (and surpass) international commitments.

<sup>46</sup> IPCC (2014a, p 11). The IPCC refers to this as “environmental effectiveness”. Other criteria might include “efficiency” and “equity”.

<sup>47</sup> Another variable, *participation*, could also be considered (e.g. Bodansky 2012). In effect, I consider participation as a factor affecting ambition: a state with low ambition will not participate.

<sup>48</sup> See IPCC (2014a, pp 17, 27). Ambition could also refer to a state's contribution to adaptation, however this paper focuses only on mitigation.

<sup>49</sup> Dai (2010). See Hafner-Burton et al. (2012, pp 69–72) for an overview of political science research on the effect of domestic politics on states' international behaviour.

<sup>50</sup> This can be contrasted with, for example, international law regarding nuclear weapons, where governments themselves typically own and control the relevant weapons. Of course, many governments *do* own or control emissions-intensive assets, particularly in the energy sector. For example, the Climate Policy Initiative found that governments own 50-70% of global oil, gas, and coal resources (Nelson et al. 2014).

The design of an international policy architecture should therefore be influenced by an understanding of how domestic factors affect international cooperation, and how cooperation affects domestic climate policy (and, ultimately, domestic emissions).<sup>51</sup>

- i) The interplay between international bindingness and domestic ambition and credibility

In its most recent assessment report, the IPCC's Working Group III (mitigation) concluded that: "Research has not resolved whether or under what circumstances a more binding agreement elicits more effective national policy".<sup>52</sup> Part of the difficulty is that there are multiple effects at work, potentially pulling in different directions. By analysing these effects in particular contexts, good predictions can be generated.

*Effect #1: Greater bindingness increases the credibility of states' commitments*

Other things being equal, the more binding and centralised the relevant provisions of an agreement are, the more likely it is that a state will implement domestic policies that meet its international commitments (i.e. the more credible those commitments are).<sup>53</sup> This is generally thought to be the case for three reasons: first, greater bindingness indicates a more serious commitment to comply with the substance of an agreement/provision.<sup>54</sup> Second, the greater the bindingness (and centralised enforcement) the greater the costs to a state of non-compliance (e.g. damage to reputation internationally and domestically, loss of mutual cooperation from other states, financial costs, sanctions etc.).<sup>55</sup> Third, internationally binding commitments trigger domestic institutional and legal processes, before and/or after ratification, that make compliance more likely.<sup>56</sup> Under many countries' domestic constitutional arrangements, ratification of a treaty can impose direct obligations under the country's domestic law or require domestic institutions (e.g. the judiciary, the executive or the parliament) to engage with the international agreement.<sup>57</sup>

The high degree of bindingness embodied in the Kyoto Protocol's emissions targets<sup>58</sup> could therefore, in theory, partly explain why most states achieved their targets. But this effect seems likely to have been small under Kyoto.<sup>59</sup> In particular, many scholars (and no doubt many countries) considered the Kyoto sanctions for non-compliance to be non-credible, thus suggesting that they are unlikely to have been a

<sup>51</sup> The effect of international cooperation on states' domestic behaviour is particularly difficult to evaluate empirically, because the counterfactual cannot be observed and there are so many other important factors at the domestic level; we cannot be sure what particular states would have done in the absence of the relevant agreement (or under a different agreement): see Hafner-Burton et al. (2012, part IV); Simmons and Hopkins (2005); Mitchell (2008).

<sup>52</sup> IPCC (2014a, p 26).

<sup>53</sup> See Raustiala (2005, p 592) and articles there cited. See Bodansky (2003) and Rajamani (2009) for expressions of this position in the climate change context.

<sup>54</sup> Raustiala (2005); Bodansky (2003);

<sup>55</sup> Bodansky (2003).

<sup>56</sup> Raustiala (2005); Bodansky (2003).

<sup>57</sup> Raustiala (2005); Bodansky (2003); Brownlie (2008, pp 45–49). And see the below discussion regarding how some countries, including the US, require the involvement of the legislature before ratification.

<sup>58</sup> The Protocol was an internationally binding instrument and hence legally binding on the parties to it (i.e. those countries that chose to ratify it). The targets for developed countries were intended, moreover, to be *strongly* binding, in that they were mandatory, specific and subject to compliance and enforcement provisions and mechanisms.

<sup>59</sup> IPCC (2014a, p 59). As the IPCC notes: "Much of [the reduction in emissions from Annex I parties, i.e. those with targets] ... was due to factors other than measures adopted under the UNFCCC, such as the economic downturn in Annex I 'economies in transition' (EITs) — Russia, former Soviet Republics, and Eastern Europe — during the 1990s."

major cause of high levels of compliance.<sup>60</sup> It is certainly the case that the Kyoto compliance mechanism failed to ensure that *all* targets were achieved (e.g. in the case of Canada, which withdrew from the Protocol).

*Effect #2: Greater bindingness probably depresses ambition and participation*

We must also consider how states might alter their *ambition* in the face of policy architectures with different degrees of bindingness (and centralisation).

Raustiala (2005) notes that, from a functional perspective, there are two possible relationships between bindingness and ambition: they could be positively correlated (because states are more willing to be ambitious in the context of a strongly binding agreement if they are concerned about the non-compliance *of others*, since they can be more confident that others will comply with a more binding agreement); or they could be negatively correlated (because states are less willing to be ambitious if they are concerned about *their own* non-compliance). As the IPCC explains:<sup>61</sup>

Because greater legal bindingness implies greater costs of violation, states may prefer more legally binding agreements to embody less ambitious commitments, and may be willing to accept more ambitious commitments when they are less legally binding.

Raustiala argues that domestic factors tend to determine the relationship between bindingness and a state's ambition.<sup>62</sup> For international environmental agreements, he argues that ambition and bindingness tend to be negatively correlated because the domestic balance of political-economic power favours constituencies that are against ambitious-and-binding forms of cooperation (e.g. high-emitting industries tend to be more politically powerful than environmental NGOs).<sup>63</sup>

This dynamic can be observed in the climate change context. For a number of systemically important, large emitters, it appears that greater bindingness depresses ambition. In particular, China, the world's largest emitter, is very reluctant to enter into strongly binding international climate commitments,<sup>64</sup> and the same appears true of the other large, emerging economies, including India.<sup>65</sup> This is systemically important, because the ambition of many other states' commitments, including the United States (the second largest emitter), is strongly linked to the level of ambition in China and other emerging economies. Thus, it seems likely that stronger bindingness in climate agreements would have a strongly depressive effect on the ambition of key emitters.

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<sup>60</sup> Halvorsen and Hovi (2006); Barrett (2009); Vezirgiannidou, 2009; IPCC (2014a, p 20). The Kyoto Protocol's compliance system is explained in UNFCCC Secretariat (2014c). The enforcement actions the Compliance Committee may undertake include "requiring" a non-compliant party to make-up any shortfall in the next commitment period, with an additional 30% penalty, and precluding them from participating in international emissions trading.

<sup>61</sup> IPCC (2014a, p 27), citing: Rajamani (2009); Raustiala (2005); Guzman and Meyer (2010); Albin (2001); Grasso and Sacchi (2011); Bodansky (1999); Bernstein (2005). See also: Bodansky (2012); Bodansky and Diring (2014); and T. Stern (2014) for similar views from the policy community. The existence of such a trade-off is suggested by the different levels of participation and ambition embodied in the Copenhagen Accord as compared with the Kyoto Protocol (especially its second commitment period): see Bodansky (2012).

<sup>62</sup> Raustiala (2005, pp 602–603).

<sup>63</sup> Raustiala (2005, p 603).

<sup>64</sup> Yu (2008); Hallding et al. (2012) pp 72–74. China's hesitancy to accept binding climate obligations arises partly from historical mistrust and aversion to international entanglements, partly from perceived reasons of unfairness, including in relation to historical emissions, and partly from concerns over growth and poverty reduction (though in this area, perspectives are changing).

<sup>65</sup> See Hallding et al. (2012).

There is a second way in which bindingness — this time in the absolute sense (i.e. whether the agreement as a whole is a legal one or not) — appears to adversely affect ambition/participation, having to do with domestic treaty ratification processes. Different states have different internal procedures for generating the domestic authorisation required for the executive to ratify an international treaty.<sup>66</sup> In many states, the executive government is free to ratify treaties of its own volition, but in others the involvement of the legislature is required. This is particularly important in the United States. Under its Constitution, the President's power to ratify a treaty is conditional on the Senate providing its advice and consent, by a two-thirds majority.<sup>67</sup> This is a very high threshold to achieve (especially in the current political environment), and partly explains why the US has not ratified a number of high-profile international treaties. During a treaty negotiation process, anticipation of such ratification challenges can influence parties' negotiating position on bindingness.<sup>68</sup>

These dynamics were clearly observed in relation to the Kyoto Protocol. First, China and other major developing countries did not accept specific, quantifiable emissions reduction obligations, leading to an asymmetry between developed and developing countries' obligations. And second, the United States did not participate at all because the senate indicated that it would not provide its consent to ratify the Protocol (partly because of the asymmetry just mentioned).<sup>69</sup> By contrast, the non-legal, non-binding, and decentralised approach of the Copenhagen Accord attracted wide participation, with many states — those accounting for 80 percent of global greenhouse gas emissions — willing to make nationally-determined, non-binding pledges.<sup>70</sup>

Finally, higher degrees of bindingness and centralisation could have an undesirable *dynamic* effect by moderating states' ambition during the lifetime of the commitment, as policymaking effort becomes narrowly focused on compliance. For example, the European Union set the scheme cap in Phase II of its emissions trading scheme in line with its Kyoto target — while this increased the likelihood of meeting the target, it also effectively precluded more ambitious emissions reductions from sectors covered by the scheme.<sup>71</sup>

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<sup>66</sup> These procedures may be set out in a state's constitution, for example.

<sup>67</sup> *Constitution of the United States of America* art II, s 2. The section refers to the power to "make" a treaty, which encompasses single-stage treaty-making processes as well (not all treaties require a two-stage process of signature-then-ratification, though major multilateral treaties typically do).

<sup>68</sup> See, e.g., Davenport (2014) and the footnote immediately below, regarding the US.

<sup>69</sup> In relation to Kyoto, in July 1997 the US Senate passed the Byrd-Hagel Resolution by a margin of 95–0, expressing the "sense of the Senate" that:

the United States should not be a signatory to any protocol to, or other agreement regarding, the [UNFCCC] at negotiations in Kyoto in December 1997, or thereafter, which would—

(A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period, or

(B) would result in serious harm to the economy of the United States.

<sup>70</sup> Briner et al. (2014). The Copenhagen Accord was a political agreement reached at the end of COP15 in Copenhagen at the end of 2009, under which a significant number of states made voluntary emissions reduction pledges.

<sup>71</sup> More generally, the potential for this kind of effect is suggested from the evidence on target-setting in public management. Targets tend to cause "threshold effects" by which

*The net effect: Greater bindingness is arguably undesirable (at present)*

Since bindingness seems likely to cause both desirable effects (on credibility) and undesirable effects (on ambition), it is important to consider the relative strength of these effects (which determines the net effect), when determining the appropriate level of bindingness for a policy architecture.<sup>72</sup>

Given that the benefits of strong bindingness (increased credibility) seem modest and that, for the time being at least, strong bindingness seems likely to have a significant depressive effect on the participation and ambition of the world's largest (and most systemically important) emitters, arguably the net effect of strong bindingness is undesirable. The policy implication is that it would be better to adopt a non-binding or weakly binding (and decentralised) approach to the substance of states' mitigation commitments, and focus on encouraging higher ambition from the key emitters.<sup>73</sup>

In any case, there are other ways of ascertaining and enhancing credibility that do not rely on international bindingness. Domestic factors also affect the credibility of states' commitments,<sup>74</sup> and in the climate context they are arguably a better indicator of credibility. For example, whether a particular commitment is perceived to be credible by others is likely to be influenced by factors such as the domestic institutions, laws, policies and measures a state already has in place (or is likely to soon have in place) to support and implement its commitments.<sup>75</sup>

ii) The interplay between policy structure and ambition

The policy structure of an international agreement and the collective ambition it embodies (to the extent it is perceived as credible) can influence individual governments' domestic climate policy decisions directly and indirectly.

First, international agreements can have a powerful signalling effect, indicating to state and non-state actors the likely evolution of the global climate and the global economy, and the associated incentives — costs, benefits, challenges and opportunities.<sup>76</sup> They can affect beliefs and expectations about changes in future technological possibilities, relative prices, institutional and regulatory arrangements, social norms and political configurations, for example.<sup>77</sup> If an agreement embodies strong collective ambition and countries' individual commitments are perceived to be credible, then domestic politics would arguably become more conducive to ambitious domestic climate policy (e.g. through effects on domestic incentives, and the normative and epistemic context in which domestic policy decisions are made).<sup>78</sup>

Second, by affecting the frequency with which states interact with one another and the nature of those interactions, the policy structure could affect how such expectations and beliefs evolve over time.<sup>79</sup> This dynamic aspect of policy structure is particularly important for climate change, as relevant technological, economic,

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performance tends to be "crowded" toward the target: see, e.g., Bevan and Hood (2006, pp 521–522) for discussion.

<sup>72</sup> Raustiala (2005).

<sup>73</sup> See also Schmalensee (1998). As discussed in Part 4, this does not preclude having *other* binding and centralised elements, for example in regard to MRV, revision processes, etc., as arguably stronger bindingness in these areas would not entail such great costs to ambition.

<sup>74</sup> See Hafner-Burton et al. (2012, p 70).

<sup>75</sup> Other factors that may influence others' judgements of credibility include the nature and ambition of the state's commitment and the state's past track record on climate change: see Green and Stern (2014) for a discussion of these factors in relation to China.

<sup>76</sup> GCEC (2014, p 280); Hepburn and Zenghelis (2014); Dai (2010).

<sup>77</sup> Hepburn and Zenghelis (2014).

<sup>78</sup> GCEC (2014, p 280); Hepburn and Zenghelis (2014); Dai (2010).

<sup>79</sup> See, e.g., Bodansky and Diringer (2014); Haas et al (1993).

political and social factors are constantly evolving in ways that affect states' climate policies.<sup>80</sup>

Third, the policy structure of any international agreement could influence the structure of domestic policy.<sup>81</sup> Recall that one of the reasons states might engage in international climate cooperation is to coordinate policy responses, which can in turn improve the effectiveness of the collective response.<sup>82</sup> Other things being equal, policymakers would arguably be more likely to adopt (and domestic non-state actors more likely to advocate) a particular policy structure domestically if it has been agreed internationally.<sup>83</sup> For example, the decision by European and Australian governments to adopt emissions trading schemes as the primary mechanism of their domestic climate policy structure appears to have been strongly influenced by the structure of the Kyoto Protocol (targets and timetables plus emissions trading).<sup>84</sup>

Fourth, the policy structure and ambition of an international agreement can affect the technical constraints on states' domestic climate action. States face technical constraints on their ambition of differing types and degrees, including in relation to financing, technology, and capacity (e.g. labour/expertise, and wider governance, institutional and administrative constraints). These constraints are often more acute in developing countries, but affect all countries to some degree. Whether and to what extent international agreements facilitate the provision of support needed to overcome these constraints can therefore directly affect domestic climate policy in the countries needing/receiving support.<sup>85</sup>

#### **b) The costs and benefits of action**

Recall that, in Part 2(b), it was posited that one reason why states might want to cooperate on climate change has to do with the structure of costs and benefits of mitigation action: states (or individuals or firms), so the standard characterisation goes, will incur immediate and certain private costs from taking action to reduce emissions and yet the climate change benefits are long-term, globally public, and of uncertain magnitude,<sup>86</sup> this creates incentives to 'free-ride'; and international cooperation can alter these incentives so that states reduce emissions.

Recent research and policy analysis has, however, called into question this simplistic characterisation of the cost-benefit profile of mitigation action, and is demonstrating the great extent to which well-designed domestic actions can be locally net-beneficial over short- to long-term timescales *in addition* to contributing to global climate

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<sup>80</sup> Schlamensee (1998). Dynamic technological and economic changes are discussed further in the next section (Part 3(b)). The importance of having a dynamic policy structure is discussed further in Part 4(d).

<sup>81</sup> The effect also operates in the other direction: domestic factors can influence the policy structure of international cooperation/agreements. See, e.g., Meckling (2011, ch 4) and Depledge (2005, pp 16–17) on the influence of a group of US businesses and NGOs in promoting the adoption of international emissions trading mechanisms as a key element of the Kyoto Protocol's policy structure.

<sup>82</sup> See above Part 2(b).

<sup>83</sup> In reality, different policy structures (even holding ambition constant) will have different distributional effects, which will affect the incentives of, and political pressure exerted by, firms and individuals in particular.

<sup>84</sup> The European Union emissions trading scheme design was closely aligned to the Kyoto Protocol (e.g. Phase II of the scheme was aligned with the Protocol's first commitment period; and credits from the Protocol's Clean Development Mechanism could be used for compliance under the scheme). On the influence of the international policy structure on Australia's carbon pricing scheme design, see Garnaut (2008, chs 8–10, 12–14).

<sup>85</sup> GCEC (2014, p 278).

<sup>86</sup> On the various sources of uncertainty in climate and economic modelling, see Heal and Millner (2013).

mitigation. These insights have major implications for the design of international climate policy architectures.

i) Local co-benefits

The first key insight from this research is that many domestic policies and measures to reduce emissions would bring local benefits in the short-medium term (i.e. not including the global benefits of reduced climate risk), even at current market prices.<sup>87</sup> These include the following:

- Many resources — energy in particular — are used inefficiently in all economies. Policies and measures to increase energy efficiency often save resources and therefore bring economic benefits;<sup>88</sup>
- In economic downturns (which many countries are experiencing today), labour and capital are deployed inefficiently. Climate policies designed to stimulate investment into infrastructure, goods and services can therefore increase efficiency in the short- to medium-term (while also promoting medium- to long-term economic growth);<sup>89</sup>
- In many countries there is scope to improve the efficiency of taxation by removing fossil fuel subsidies, implementing carbon (and other environmental) taxes<sup>90</sup> and removing more distortionary taxes;<sup>91</sup>
- Many low/zero-carbon substitutes for existing goods, services and processes are cheaper than incumbents at current prices (e.g. prices of solar PV and onshore wind in many contexts<sup>92</sup>). When (and in many cases, before) the incumbents reach the end of their operational lifetimes, it is economically beneficial to replace these with the zero/lower-carbon substitutes (and when new units are needed, the latter will reduce emissions growth relative to adding higher-carbon incumbents);<sup>93</sup>
- There are a great many unpriced costs and benefits that don't show up in conventional price comparisons (e.g. of renewable vs fossil-fuel energy generation). When things like air and water pollution, health and safety (of workers and the public), biodiversity protection, energy security, visual amenity, noise, congestion etc. are taken into account in policy analysis, many zero/lower carbon options will bring great benefits.<sup>94</sup>

Because of these co-beneficial effects, a large portion of countries' domestic emissions reductions would be locally *net*-beneficial, and hence in states' self-interest to implement (and where net costs are involved, the net costs would be lower than otherwise).<sup>95</sup> The New Climate Economy report finds that 50-90 percent of the emissions reductions needed to put the world on a plausible 2°C pathway by 2030

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<sup>87</sup> See generally World Bank (2012); Parry et al. (2014); Stern (2012); GCEC (2014).

<sup>88</sup> Policies to improve energy efficiency can thus reap immediate economic benefits in the form of greater productivity and hence output (see, e.g., Ward et al. 2012).

<sup>89</sup> Zenghelis (2012); UCL Green Economy Policy Commission (2014).

<sup>90</sup> Or auctioning permits from emissions trading schemes.

<sup>91</sup> Goulder (1995); Bowen (2012); GCEC (2014).

<sup>92</sup> See GCEC (2014) for discussion and references. See also Liebreich (2014).

<sup>93</sup> GCEC (2014).

<sup>94</sup> GCEC (2014); Parry et al. (2014).

<sup>95</sup> GCEC (2014). This assumes that it is in states' self-interest to maximise net benefits for its citizens. This is, however, a controversial definition of "self-interest", whether taken as a normative statement or an empirical one. However I cannot explore this issue further here.

would be net beneficial.<sup>96</sup> While the specific sums are contestable (in both directions), they suggest that the available pool of locally net-beneficial emissions reductions would be large.

Yet, the fact that many locally net-beneficial emissions reduction opportunities are not already being undertaken suggests that countries face other constraints on their ambition. One set of constraints is political: policies that are net-beneficial will still have *absolute* costs; how these costs (and the absolute benefits) are *distributed* matters greatly in political terms; and the ‘losers’ from climate policy will often be concentrated in particular industries or sectors that are economically and politically powerful (e.g. fossil fuel industries and utilities). A second set of constraints is technical, as many governments face technical barriers to implementing net-beneficial climate policies, even when they are politically disposed to do so.<sup>97</sup> This suggests that, for this large pool of locally net-beneficial domestic mitigation, international cooperation should focus more strongly on overcoming *these* constraints than on trying to change the incentive structures states face (e.g. by establishing rules with sanctions for non-compliance).

## ii) Dynamic innovation effects

The second key insight from this research is that strong and well-structured policies and investments in innovation — i.e. the research, development, demonstration and widespread deployment of low/zero-carbon technologies, products, processes and services — would likely bring very high economic (and other) benefits.<sup>98</sup>

First, it would likely bring medium- to long-term returns in the form of cheaper low/zero-carbon substitutes for existing high-carbon goods and services.<sup>99</sup> Indeed, the main reason some low/zero-carbon technologies are cheaper than their high carbon incumbents at current prices (which fail to account for full costs and benefits that would make the former even *more* attractive) is due to past public and private investments in low/zero-carbon innovation.<sup>100</sup> With further, and much stronger innovation activity, an even larger portion of countries’ domestic emissions reductions would become locally net-beneficial.

Second, and even more importantly, innovation tends to bring wider economic benefits in the form of knowledge spillovers that contribute to whole-economy GDP growth.<sup>101</sup> Empirical evidence suggests that low/zero-carbon innovation produces significantly more knowledge spillovers than innovation in incumbent, high-carbon

<sup>96</sup> GCEC (2014). This is based on achieving the median value of the IPCC’s scenarios for holding to 2°C with a greater than 66% probability, under which global emissions fall to 42GT per year by 2030, relative to the IPCC’s business-as-usual baseline scenario, under which global emissions reach 68GT by 2030 (see IPCC 2014b, Figure SPM.4). This is further explained in a forthcoming technical note to the New Climate Economy report (NCE 2014).

<sup>97</sup> For example, financing, technology and capacity constraints, which can be especially acute in developing countries (see above Part 3(a)(ii)).

<sup>98</sup> Aghion et al. (2014); Mazzucato (2013); Perez (2014); Mazzucato and Perez (2014); Stern (2012).

<sup>99</sup> Aghion et al. (2014).

<sup>100</sup> New technologies typically follow a downward-sloping ‘cost curve’: as demand for the technologies grows and more units are deployed, costs fall as a result of economies of scale (fixed costs per unit of output fall) and ‘learning by doing’ (efficiencies and cost reductions are discovered along the supply chain through the experience gained from producing the new technology as companies experiment and compete with one another for market share). Policy interventions — such as feed-in-tariffs and renewable energy targets — can provide, and in many cases *have* provided, the demand for available renewable energy technologies that are at the higher end of their cost curves.

<sup>101</sup> Aghion et al. (2014).

technologies, and many of these spillover benefits accrue to the local economy.<sup>102</sup> A strong, green innovation agenda is thus also a medium- to long-term growth and prosperity agenda.<sup>103</sup> As Professor Stern has argued, the “radical change necessary” to put the world on a less than 2°C pathway “is on a scale which would essentially involve an energy-industrial revolution, or major wave of technological change, and experience of previous such changes suggest they are associated with 2 or 3 decades, or more, of investment, innovation and growth”.<sup>104</sup>

Innovation policy has its own complexities: it is hard to do well; the scale of the benefits is subject to uncertainty; the timeframes in which benefits accrue can often be long; and the distribution of the benefits from innovation is partly private, partly public, partly local, and partly global (and the proportions are uncertain). As such, the extent to which one country perceives innovation to be locally net-beneficial will depend on the quality of its innovation system, and how it treats/discounts future, uncertain and non-local benefits. These uncertainties, and the partly-global-public benefits that arise from innovation suggest that there is a significant role for international cooperation regarding low/zero-carbon innovation. Moreover, innovation policies are likely to be more effective if coordinated across countries.<sup>105</sup> Again, this suggests a more targeted policy architecture is needed at the international level than has traditionally been assumed necessary.<sup>106</sup>

### iii) Residual, locally net-costly mitigation

Finally, there will inevitably remain (after the full costs and benefits, and potential for innovation, are estimated and accounted for) a pool of emissions in each country that it is locally net-costly for that country to reduce within the relevant decarbonisation timeframe (i.e. for which the benefits are ‘only’ the global climate mitigation benefits). These are likely to be concentrated in highly trade-exposed, emissions-intensive sectors such as international aviation and transport (so-called ‘bunker fuels’), steel, cement, and exported fossil fuels.<sup>107</sup> International cooperation in these areas is thus likely to require a focus on overcoming incentives to free-ride.

## 4. The emerging policy architecture for an agreement in Paris 2015 and its likely effectiveness

The approach currently being pursued in the negotiations leading up to Paris, at least since the relevant decision in COP19 in Warsaw at the end of 2013,<sup>108</sup> can be considered a ‘hybrid’ policy architecture, containing a mix of both ends- and means-focused policy elements, binding and non-binding elements, and centralised institutional elements and decentralised elements.<sup>109</sup> This section outlines the main options being pursued, and, drawing on the discussion from Parts 2 and 3, considers their likely effectiveness (including suggestions as to how effectiveness could be increased).

<sup>102</sup> Dechezleprêtre et al. (2013); Dechezleprêtre and Glachant (2014).

<sup>103</sup> Perez (2010; 2014); Mazzucato and Perez (2014).

<sup>104</sup> Stern (2014, p 435).

<sup>105</sup> See, e.g., IEA (2012); GCEC (2014, ch 7).

<sup>106</sup> See the discussion of incentives in Part 2(b), above.

<sup>107</sup> Other net costly mitigation options are likely to relate to recently-built, long-lived, high-carbon power generation and industrial infrastructure, which will either need to be retired early or fitted with carbon capture and storage which is likely to add greatly to costs (GCEC 2014) and would cause few local co-benefits and additional local trade-offs.

<sup>108</sup> UNFCCC (2013).

<sup>109</sup> Bodansky and Diringer (2014).

### a) “Intended nationally-determined contributions”

The Warsaw COP Decision calls on parties to prepare “intended nationally determined contributions” ((I)NDCs) and to communicate them well in advance of COP21 in Paris.<sup>110</sup> The idea is that the substance of countries’ commitments will be largely or entirely a matter for each country to determine domestically.

While the legal form of these commitments has not yet been resolved, there is a consensus beginning to emerge around the idea that NDCs themselves will not be internationally legally binding, but that there will be binding obligations with regard to process/conduct. As suggested by a number of parties, this could be facilitated by incorporating process obligations (e.g. to submit or record an NDC<sup>111</sup>) in the main, legally-binding agreement and to have the NDCs themselves recorded in a separate, non-binding document, such as a schedule to the main agreement.<sup>112</sup>

Ensuring that the substance of countries’ commitments are nationally-determined and are not internationally legally-binding is likely to be desirable from the point of view of effectiveness, for the reasons discussed in Part 3(a): it will likely facilitate the participation and greater ambition of the largest, systemically important, emitters such as China and the US.<sup>113</sup>

Moreover, there are ways — under active discussion in and around the negotiations — in which the policy architecture of the agreement could improve the credibility and ambition of countries’ commitments, both initially (in Paris) and over time, and hence increase the effectiveness of the agreement. These are considered in turn below.

### b) The form of commitments: promoting credibility and coordination

The Warsaw Decision calls on parties to communicate their INDCs “in a manner that facilitates the clarity, transparency and understanding of the intended contributions”,<sup>114</sup> and calls for the “information that Parties will provide when putting forward their contributions” to be determined at COP20 in Lima.<sup>115</sup> This suggests there will be an element of centralisation that prescribes or limits the form that states’ commitments must take, and the information that must accompany them.

Various options under discussion with regard to the form of INDCs could improve the effectiveness of the policy structure. For example, the main agreement could include a binding requirement, or a less stringent normative prompt — such as a guideline, an expectation, a default rule, or a menu of alternatives (a ‘nudge’,<sup>116</sup> if you will) — with regard to the following aspects of the form of INDCs:<sup>117</sup>

<sup>110</sup> UNFCCC (2013, cl. 2(b)).

<sup>111</sup> But no obligation on the state to *achieve* the substance of that NDC.

<sup>112</sup> See, e.g., New Zealand (2014) and United States (2014). It should also be noted that this nationally-determined approach is likely to overcome the rigid “firewall” between Annex I and non-Annex I countries, since all countries’ commitments will be nationally-determined (though this is still likely to be contentious in the lead-up to, and in, Paris). See T. Stern (2014) for a developed country perspective on this issue.

<sup>113</sup> Through this hybrid structure, it may even be possible for the US to participate in the legally binding main agreement. It has been argued that if the legally-binding aspect of the agreement merely develops or “updates” existing commitments made under the UNFCCC (which the US *has* ratified), then the executive will not require the consent of the Congress to become a party to it (see Davenport 2014). This provides strong grounds for adopting a hybrid approach in which “new” commitments (i.e. the US’ mitigation and financial contributions) are contained in a separate, non-binding instrument.

<sup>114</sup> UNFCCC (2013, cl. 2(b)).

<sup>115</sup> UNFCCC (2013, cl. 2(c)).

<sup>116</sup> Thaler and Sunstein (2009).

<sup>117</sup> See Bodansky and Diringier (2014).

- Whether it must be a target (end) and/or policies and measures (means);
- Whether some kind of indicative, longer-term plan (e.g. a decarbonisation plan) is to be included;
- What type of targets are allowed/encouraged (absolute emissions reduction, reductions below ‘business as usual’, emissions intensity targets, sectoral targets, etc.);
- Whether targets or measures must be quantified (or at least quantifiable);
- Whether an unconditional minimum commitment must be specified and/or whether a conditional element may be included (e.g. a range of outcomes), and what the conditions may relate to;
- The timeframes of different kinds of commitments;
- Which sectors and gases are included within the scope of the commitment;
- Information about the assumptions and accounting rules associated with the commitment; and
- Whether, and what, information is required as to the domestic institutions, laws and policies in place to achieve or support the commitment.<sup>118</sup>

In light of the analysis in Parts 2 and 3, three of these aspects are likely to be particularly helpful in increasing effectiveness.

First, all parties should be required or encouraged to include means-based elements — institutions, laws, policies and measures — within their commitments. Given that it is primarily domestic policies that directly affect the production and reduction of emissions (i.e. they do most of the ‘work’ in reducing emissions<sup>119</sup>), focusing states’ attention on domestic policy and institutional development would likely promote long-term effectiveness.<sup>120</sup> It would also promote policy coordination in particular sectors (since policies tend to be sectorally-focused). Since incentives for domestic mitigation differ considerably across sectors, greater sectoral coordination is also likely to promote greater effectiveness (see Part 3(b)).

Second, parties should be required or encouraged to implement their international commitments in domestic law (and this reinforces the case for including ‘means’-based elements, since these typically require legislation/regulation). As a matter of international law, there is little that could be done to enforce such a requirement, but it would serve a useful normative function by creating expectations of domestic implementation, and help to raise the credibility of countries’ commitments.<sup>121</sup>

Third, the agreement should require or encourage countries to incorporate at least some commitments that have a short (e.g. five year) timeframe, to facilitate regular review and revision (discussed further below).

### **c) Transparency, review and participation**

The effectiveness of (nationally-determined, non-binding) mitigation commitments can also be improved by having centralised and (moderately) binding rules and processes for transparent measurement, reporting and accounting, and for regular

<sup>118</sup> Assuming that these are not themselves *part of* the state’s NDC, which they could be.

<sup>119</sup> International targets and goals can be important signalling devices, as discussed earlier, hence they do some ‘work’.

<sup>120</sup> Schmalensee (1998).

<sup>121</sup> Bodansky and Diringer (2014, p 10).

information-sharing, verification and review.<sup>122</sup> In the current context of relatively low ambition and trust among parties,<sup>123</sup> such a system of MRV could help build mutual trust and confidence among parties, enhance the credibility of commitments, and enable shared learning, leading to higher ambition from states over time.<sup>124</sup>

This spirit of openness could also be fostered by allowing wide participation, domestically and internationally, in the formulation, review and revision of parties' contributions. For example, the Paris agreement could include provisions encouraging parties to provide domestic opportunities for wide public participation, particularly from especially affected groups such as young people, indigenous groups, workers/unions, and so on, in the development of the country's nationally-determined contributions.<sup>125</sup> Internationally, participation could be fostered through allowing some kind of *ex ante* review (in addition to *ex post* review) of INDCs with participation from experts, international peers and civil society observers.<sup>126</sup>

Much of this can build on the existing MRV system that has evolved in recent years to include more regular reporting for developed countries (Biennial Reports and the International Assessment and Review process) and for developing countries (Biennial Update Reports and International Consultation and Analysis).

#### **d) (Upward) revision of commitments**

It is almost certainly the case that countries' NDCs in Paris will not, in one 'grand bargain', collectively imply emissions reductions that would achieve the global goal of holding warming to less than 2°C above pre-industrial levels. Due to political, technical and other constraints on ambition, there will inevitably be a residual 'emissions gap'.<sup>127</sup> Accordingly, a dynamic policy structure that enables increasing ambition over time will be critical to the effectiveness of any new agreement.

In addition to the ongoing reviews of states' emissions, policies and measures, the Paris agreement is likely to, and should, contain some kind of regular review and revision process, whereby parties are expected to update their NDCs. The United States, for example, has proposed a five-yearly review and revision cycle, with the first commitments being expressed to end in 2025.<sup>128</sup> The expectation that commitments be revised *upwards* could be reflected in the agreement.<sup>129</sup>

Such a review-and-revision system is likely to promote greater ambition over time on the reasonable assumption that domestic constraints on states' ambition are likely to continue to fall over time. As the Submission from the United States (2014) puts it: "Political will to take ambitious action is generally increasing over time, technology is

<sup>122</sup> To achieve this function in the context of NDCs, MRV methodologies and guidelines will need to be developed for the diverse target-types, policies and measures that countries are able to propose (and indeed some such methodologies are already under development).

<sup>123</sup> See Rajamani (2009).

<sup>124</sup> Bell et al. (2013); Haas et al. (1993). Some states are reluctant to adhere to strict transparency guidelines, meaning a greater focus on transparency might deter ambition. However, there is a long and relatively successful history of MRV within the UNFCCC and Kyoto (see IPCC 2014, p 20), and the benefits of transparency can be strong. It is thus reasonable to expect that continued improvement in transparency will on balance promote ambition over time, rather than deter it.

<sup>125</sup> Public participation clauses can be found in a number of international environmental agreements: see Bodansky and Diring (2014, p 12).

<sup>126</sup> See Bodansky and Diring (2014, pp 12–13).

<sup>127</sup> On the current 'emissions gap', see UNEP (2013).

<sup>128</sup> See United States (2014). The Global Commission on the Economy and Climate has also suggested that countries have rolling five-and-ten-year commitments that are reviewed and revised upwards every five years: see GCEC (2014, pp 280–281).

<sup>129</sup> See Bodansky and Diring (2014, pp 13–14).

advancing, and the costs of action are decreasing. We should design the system to capture as much increasing ambition as possible.” For these reasons, US lead negotiator, Todd Stern, stated frankly that “we think the target we could put forward for 2030 five years from now will be measurably higher than a 2030 target we could put forward now”.<sup>130</sup>

#### e) A long-term goal

One area of the negotiations that is currently unresolved is whether the Paris agreement will specify an additional long-term mitigation goal, and if so, what this should be.<sup>131</sup>

The Cancún decisions in 2010 codified the global goal of holding the increase in global average temperature to less than 2°C above pre-industrial levels. However, from the perspective of the agreement’s effectiveness, it is questionable how helpful this goal is. The main function of expressing a long-term goal is its normative, signalling function. However, the signal sent by the 2°C goal is ambiguous,<sup>132</sup> since different mitigation pathways imply different *probabilities* of staying within 2°C, and those probability estimates themselves are subject to wide confidence intervals.<sup>133</sup> Accordingly, alternative formulations of the goal have been proposed.<sup>134</sup>

One proposal that has received prominent discussion is the goal of achieving ‘net-zero’ global emissions within the second half of this century.<sup>135</sup> The concept is derived from an understanding of the emissions reduction pathways likely to be consistent with a greater than 50 percent probability of staying within 2°C.<sup>136</sup> Countries in Paris are unlikely to agree on a specific date for achieving net-zero, but if we consider the net-zero by 2050 goal to represent the most ambitious 2°C pathway feasible, and net-zero by 2100 (corresponding to a mere 50-50 chance of staying within 2°C) to represent the upper limit of what could plausibly be termed a ‘2°C goal’, then we can reasonably say that holding to 2°C will require net annual emissions flows to fall to zero by some point within the second half of this century. It may therefore be feasible to build consensus around including a statement to that effect in the Paris agreement.

While this half-century window would leave a significant margin of ambiguity, expressing the goal in this way would at least be more specific and concrete than the 2°C formulation and would therefore likely improve the effectiveness of the Paris

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<sup>130</sup> T. Stern (2014).

<sup>131</sup> The overarching objective of the Convention is to stabilise greenhouse gas concentrations “at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC, art 2).

<sup>132</sup> GCEC (2014), p 280; Haites et al. (2013).

<sup>133</sup> See IPCC (2014b).

<sup>134</sup> One proposal is for a ‘trillion tonne’ carbon budget. This is a potentially useful concept for analytical purposes. However, I leave this aside here as it is also a cognitively complex indicator and therefore has inferior ‘signalling power’ compared with the net zero goal. For discussion of the carbon budget approach, see Pidcock (2013).

<sup>135</sup> Haites et al. (2013). For discussion, see, e.g., GCEC (2014).

<sup>136</sup> According to the IPCC (2014b), a goal of staying below 2°C with a >50% probability would require annual CO<sub>2</sub>e emissions to peak very soon and fall to roughly zero by around the end of this century. Staying below 2°C with a more than 66% probability would require emissions to fall to zero before the end of the century. Roughly speaking, the earlier emissions are phased out, the higher the probability of staying below 2°C (and the higher the probability of staying below lower maximum temperature increases, e.g. 1.5°C, which many, including the Alliance of Small Island States, argue is a better goal). Haites et al. (2013) advocate a goal of net zero emissions by 2050, corresponding to a very high likelihood (more than 90% probability) of staying within 2°C and a more than 50% probability of staying within 1.5°C.

agreement.<sup>137</sup> It would send the clear message that greenhouse gas emissions from every country and every sector need to be phased out, and by 2100 at the absolute latest.<sup>138</sup> As such, it would provide clearer guidance to policymakers, businesses and citizens about the desired transition pathways, around which expectations and actions can converge.<sup>139</sup> Moreover, as it uses a simple number and concept — ‘zero emissions’ — it is cognitively undemanding and “psychologically salient”, and therefore more likely to be understood, remembered and believed to be credible.<sup>140</sup>

#### **f) Finance, Technology and Capacity-Building**

Another important area of great relevance to the effectiveness of the Paris agreement is that of FTCB — in particular, the FTCB contributions of developed countries to assist developing countries with mitigation and adaptation.

Within the UNFCCC process, developed countries have agreed to mobilise collectively US\$100 billion by 2020 for mitigation and adaptation finance, partly through the Green Climate Fund. The Paris outcome will need to embody significant advances in the public component of this financing if it is to be amenable to developing countries. It may be that these financial contributions will be treated in a similar way to mitigation, with the main agreement containing a reference to, or procedural obligations regarding, the provision of finance, but with the actual promised amounts recorded in a parallel process or instrument outside of the main, legally-binding agreement.<sup>141</sup>

Much stronger international cooperation on finance and technological innovation than is likely to be embodied in the main agreement will be critical if domestic constraints on ambition are to be progressively overcome.<sup>142</sup> Innovation is discussed further in the next section.

### **5. Beyond the Paris Agreement: Additional international initiatives and a just domestic transition**

It was argued in the previous section that the mitigation aspects of the emerging Paris agreement, if agreed, are likely to be relatively effective (at least compared with previous UN efforts), particularly if they include the elements suggested above. However, there are many elements that are not currently ‘on the table’ for Paris, but which could usefully be the focus of international cooperation and domestic action.

#### **a) International initiatives for ‘narrower and deeper’ cooperation**

Given the scope for effective international cooperation on innovation and policy at the sectoral level identified in Part 3(b) of this paper, there would be value in ‘narrower’ groups of willing states (and non-state actors) cooperating on ‘deeper’ initiatives to

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<sup>137</sup> See also GCEC (2014) p 280.

<sup>138</sup> In practice, emissions from some sectors will be hard to eliminate entirely, meaning they will need to be offset by emissions sinks (or ‘negative emissions technologies’) in other sectors to attain net-zero.

<sup>139</sup> GCEC (2014) p 280.

<sup>140</sup> See Kahneman (2011) (reviewing the evidence on the psychological effects of differently presented facts and data) and Gauri (2012) (discussing this evidence in relation to the psychological salience of international development goals).

<sup>141</sup> Such an arrangement may be practically necessary to accommodate the participation of the US in the main agreement: see above Part 3(a)(i).

<sup>142</sup> The task includes further public investments by governments in their own economies, public financial flows among middle and low-income countries, and, of course, large private financial flows. See GCEC (2014, ch 6).

decarbonise particular sectors as a way to complement and expand upon the ‘broad but shallow’ main agreement likely to emerge in Paris.<sup>143</sup> Some such initiatives have already been developed.<sup>144</sup> Paris could be a valuable forum for the initiation or extension of such initiatives: they could be advanced in the lead-up to, and ‘on the side’ of, the Paris negotiations. They could also be reflected and advanced in the Paris agreement itself — for example, through states’ NDCs and, in the case of energy innovation, through the UNFCCC’s technology mechanism, though this seems less likely in the near term.<sup>145</sup>

Three such initiatives are suggested below, focusing on the energy sector.

i) A medium-term goal for electricity sector decarbonisation

Achieving the phase out of emissions from each sector<sup>146</sup> will require strategic thinking about the sectoral sequencing of decarbonisation. This is because the availability and cost of low/zero-carbon substitutes differs across sectors, and because the viability of some phase-out options in particular sectors depends on options pursued in other sectors.

The electricity sector should be the most urgent priority for decarbonisation.<sup>147</sup> There are several reasons for this prioritisation:<sup>148</sup>

- Power generation is a major source of greenhouse gas emissions in most countries;<sup>149</sup>
- Low-carbon power generation is well-understood and feasible, with many options available; and
- Decarbonised electricity has an important role to play in reducing emissions in other sectors, especially transport (through battery-powered electric vehicles and rail), residential heating (through ground source and air source heat pumps) and potentially some parts of industry.

Moreover, the electricity sector, fossil fuels and renewable energy are the most politically salient objects of the global climate change debate. Major progress in

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<sup>143</sup> Keohane and Victor (2011). On the broad/shallow vs narrow/deep distinction, see IPCC (2014a, p 18).

<sup>144</sup> For example, the Clean Air and Climate Coalition to reduce short-lived climate pollutants, and the REDD+ Partnership: see, respectively, <http://www.ccacoalition.org/> and <http://reddpluspartnership.org/en/>.

<sup>145</sup> Perhaps, more realistically, such initiatives could be “recognised” or “endorsed” in the main agreement in Paris.

<sup>146</sup> As implicitly required by the 2°C goal and explicitly required by the net-zero goal. See above Part 4(e).

<sup>147</sup> This is an important conclusion from a number of technical studies that have considered deepcarbonisation pathways in depth. The UK Committee on Climate Change (CCC), a leading authority on the technicalities of sectoral decarbonisation (it advises the UK Government on measures to achieve the UK’s legislated 80% emissions reduction target by 2050), has emphasised measures to achieve especially deep reductions in the power supply sector, along with large reductions in the buildings and transport sector, by 2030 (other sectors would become the focus of mitigation efforts post-2030): see, e.g., CCC (2013, 2014). Country-based modelling for the Deep Decarbonisation Pathways Project (IDDR/SDSN 2014) has also revealed the importance of prioritising the decarbonisation of the power sector (especially in large industrialised countries).

<sup>148</sup> See Fankhauser (2012).

<sup>149</sup> Electricity and heat production together constitute one quarter of global CO<sub>2</sub>-e emissions (IPCC 2014b).

decarbonising electricity could build powerful political momentum towards the decarbonisation of other sectors.

There is therefore merit in a coalition of willing countries agreeing a shared goal to decarbonise electricity within the first half of this century — by 2050 at the latest.<sup>150</sup> As the experience in the United Kingdom is demonstrating, it is reasonable to expect developed countries to decarbonise their electricity sectors in the next 15 years if the right strategies, policies, innovation incentives and investments are implemented.<sup>151</sup> It would be reasonable to expect developing countries to adopt electricity decarbonisation plans on a similar, but somewhat later timescale, given sufficient innovation and technical assistance by developed countries.

## ii) Phasing out coal

Within efforts to decarbonise electricity, there is a strong case for international cooperation specifically to phase-out coal.<sup>152</sup> Coal is the single largest contributor to global greenhouse gas emissions from energy.<sup>153</sup> If the world is to stay within reasonable carbon budgets, only a small fraction of the world's remaining fossil fuel reserves can safely be burned, and the economic case is strongest for closing coal first within the 'burnable' margin.<sup>154</sup> Moreover, as the Global Commission on the Economy and Climate surmised, "pollution from burning coal is a contributor to the estimated 3.7 million premature deaths each year from outdoor air pollution, and coal production also causes ill health, injuries and deaths".<sup>155</sup> And despite the fact that these effects cause economic damages well in excess of the market price of coal in many countries, as the International Monetary Fund has recently demonstrated, coal remains very lightly taxed in many parts of the world.<sup>156</sup> This means there are very high co-benefits from substituting away from coal.<sup>157</sup>

There are two forms of international cooperation directly concerned with coal that could be effective in reducing domestic constraints on phasing out coal.

The first concerns the consumption of coal, particularly for power generation. The Global Commission on the Economy and Climate has argued that high-income countries should commit now to end the building of new unabated coal-fired power generation and accelerate the early retirement of existing unabated capacity, while middle-income countries should aim to limit new construction now and halt new builds by 2025.<sup>158</sup> Since political and technical barriers are the main reasons for continued investment in coal-fired power generation,<sup>159</sup> international cooperation in declaring the above-mentioned goals could play a valuable normative/signalling role, helping to catalyse locally net-beneficial domestic efforts. In a context where coal

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<sup>150</sup> See also GCEC (2014, p 301). Angel Gurría (2013) made a similar argument when he called for the goal of eliminating fossil fuel energy emissions by the second half of this century as the central objective on the pathway to net zero emissions.

<sup>151</sup> CCC (2013).

<sup>152</sup> GCEC (2014); Collier and Venables (2014).

<sup>153</sup> Coal combustion generated 44% of global CO<sub>2</sub> emissions from energy in 2011 (oil 35%; gas 20%; other 1%): IEA (2013a).

<sup>154</sup> Nelson et al. (2014); Collier and Venables (2014); IDDRI/SDSN (2014). See also Carbon Tracker Initiative (2013).

<sup>155</sup> GCEC (2014).

<sup>156</sup> Parry et al. (2014).

<sup>157</sup> See GCEC (2014); Hamilton (2014).

<sup>158</sup> GCEC (2014, p 301).

<sup>159</sup> When the full costs and benefits are considered, energy efficiency and zero/low-carbon power generation sources are likely to bring greater local net-benefits than building new coal-fired power plants in many parts of the world: see GCEC (2014, chs 1, 4–6) for discussion.

investments are already coming under increasing threat from a range of different sources,<sup>160</sup> signalling a 'no coal' norm at the international level could potentially lead to a political-economic tipping point toward the phasing out of coal.

The second concerns the production of coal, especially for export, and perhaps also the phase-out of recently built coal-fired power generation capacity (particularly in developing countries). In both of these cases, the local cost profile of these measures is likely to be less attractive to governments, as the costs may outweigh the local co-benefits (especially where governments own the assets in question).<sup>161</sup> In these cases, therefore, international cooperation could usefully focus on the coordination of production phase outs (with developed countries taking the lead) and the provision of financial and technical support to developing countries for whom such measures would be locally net-costly.<sup>162</sup>

### iii) Zero carbon energy innovation

Zero/low-carbon innovation was identified in Part 3 as an important area for international cooperation that could greatly expand technical options and improve the cost-benefit profile of local mitigation options. In the electricity sector, international cooperation could valuably encompass the following:

- scaled-up public research and development funding (coordinated national funding and, where appropriate, collaborative international partnerships);<sup>163</sup>
- public-private regional networks focused on the development and demonstration of new and locally-adapted technologies and processes;<sup>164</sup>
- promoting green investment banks/public funds to mobilise public venture capital for green innovators with high growth potential (this should be in addition to the infrastructure function of such banks/funds);<sup>165</sup>
- expanded and better coordinated deployment support policies (feed-in tariffs, renewable energy obligations, etc.).<sup>166</sup>

Importantly, these institutions should reflect the diverse needs and capabilities of different types of countries. High income countries should focus more on frontier innovation, and other countries on adaptive innovation and diffusion of new technologies and processes.<sup>167</sup>

## **b) Domestic implications of a more decentralised international architecture: A just transition**

An important implication of the insights in Part 3, and of the hybrid policy architecture that is likely to form the basis for agreement in Paris, is that there must be a much greater focus on mitigation *within* countries, as they find their own pathways of structural transition to a decarbonised economy.

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<sup>160</sup> These include: domestic policy pressures, from Washington to Beijing, in the form of increased direct regulation of coal-fired power plants; social campaigns for fossil fuel divestment, and local activism against new fossil energy projects across the world; and economic pressures from investors increasingly concerned about the risk of stranded assets: see, e.g., Gore and Blood (2014).

<sup>161</sup> Nelson et al. (2014); Collier and Venables (2014).

<sup>162</sup> On the coordination of coal mining phase-outs, see Collier and Venables (2014).

<sup>163</sup> GCEC (2014); IEA (2013b); Murray (2014).

<sup>164</sup> GCEC (2014).

<sup>165</sup> Mazzucato (2013).

<sup>166</sup> IEA (2012).

<sup>167</sup> Aghion et al. (2014).

While the net economic benefits from structural transformation would likely be very high, some parts of the economy will need to contract, therefore some firms and industries will become less competitive and decline, and some workers will lose their jobs and face dislocation.<sup>168</sup>

There is much that governments can and should do to promote a *just* transition for affected workers and communities in ways that promote and support the achievement of the ultimate decarbonisation objectives. Detailed consideration of such an agenda is beyond the scope of this paper, however it could include the following:<sup>169</sup>

- Policies to ensure that the costs of transition are borne primarily by those most able to pay, and the benefits redound most strongly to the least well off — this can be achieved through the packaging of low-carbon policies with progressive fiscal (tax and expenditure) reforms;<sup>170</sup>
- Public education and training policies (e.g. funding of schools, technical institutions and universities) directed strongly toward participation in a zero-carbon economy;
- Targeted support — including retraining and reskilling, and transitional financial support — for workers from structurally declining (high-carbon) industries to support their transition into growth industries in the zero-carbon economy;<sup>171</sup>
- Ensure that the zero carbon transition is procedurally just by consulting with workers and unions in the policy development process, and by phasing-in policies gradually according to a transparent schedule, so that firms and workers have a confident sense of future direction and yet have time to adjust in the shorter-term.

While these are largely domestic matters, reference to just transition principles, including domestic stakeholder participation in the setting and revision of NDCs as suggested earlier, could helpfully be included in an international agreement in Paris.

## 6. Conclusion

The Paris 2015 conference presents an important opportunity for governments to negotiate a new international climate agreement. A question of central importance is: what kind of policy architecture — what policy structure, degree of centralisation, and legal form / degree of bindingness — is likely to be most effective in generating sufficient emissions reductions to avoid dangerous climate change?

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<sup>168</sup> GCEC (2014, ch 5).

<sup>169</sup> See also GCEC (2014, ch 5).

<sup>170</sup> For example, increased government revenues from carbon pricing (and other forms of environmental taxation) can be ‘recycled’ in ways that increase incentives for labour market participation generally (and increase the efficiency of the tax system overall), such as by reducing personal income tax. For discussion, see Goulder (1995), Bowen (2012) and GCEC (2014). The progressivity (and hence the fairness) of the tax system can be enhanced if the recycled tax reform focuses on reducing the income tax (or other labour-related taxes) paid by low and middle income workers. See Green and Stern (2014) for a discussion of policy packaging and progressive tax reform with regard to China.

<sup>171</sup> Policies and investments (and especially public-private partnerships) that incentivise private companies to invest more strongly in the education and training of their workforce would also be desirable: Mazzucato and Perez (2014).

This paper has highlighted the importance of two sets of issues for analysing the likely effectiveness of different architectures: the interplay between policy architecture and domestic factors; and the costs and benefits of mitigation. It then argued, drawing on insights from this analysis, that a hybrid architecture, as appears likely to be adopted in the main agreement in Paris, is likely to be relatively effective — at least compared with the previous major climate negotiations and agreements — and could be made even more effective. In other words, *this time is different*.

But will it be different enough?

The final part of the paper — again drawing on the insights from Part 3 — suggested a number of additional (narrower but deeper) international cooperative initiatives that could enhance the effectiveness of international climate cooperation overall. These could be advanced on the side of the main negotiations in Paris (though they could also be reflected in the main agreement in Paris, or at a future time). This part of the paper also pointed out some important implications of the likely Paris architecture for domestic efforts, namely the need to focus efforts on achieving a deep, timely and just transition within countries.

The work of transitioning justly to a zero-carbon world is just beginning. Paris 2015 looks like it will help. But on 11 December 2015, when the Paris conference comes to a close, the hardest work will remain to be done.

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