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Networked Carbon Markets

Carbon Market Clubs and the New Paris Regime

July 2016

WORLD BANK GROUP
Climate Change

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Paper for the World Bank Group's Networked Carbon Markets Initiative

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Climate Strategies

WORLD BANK GROUP
Climate Change

This Discussion Paper was prepared by the authors for the World Bank Group's Networked Carbon Markets (NCM) initiative.

The NCM initiative is a key component of the World Bank Group's long-term efforts to promote and enable carbon pricing, and complements on-going work to assist countries in designing and implementing carbon pricing systems through, for example, the Partnership for Market Readiness and Carbon Pricing Leadership Coalition.

It is exploring how a future international carbon market could link a 'patchwork' of different, domestic climate actions. The end-goal is to develop the services and institutions needed to enhance transparency, comparability, and fungibility of heterogeneous climate actions, for a connected international carbon market that is liquid and delivers climate-smart financing efficiently.

To date, it has launched a global discussion on the post-2020 services and institutions that might be needed for a connected international carbon market in the future.

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Executive Summary

This paper looks at existing and future climate clubs or club-like arrangements which bring together groups of national Governments, cities and other subnational jurisdictions, and business organisations, in pursuit of joint plans for climate change mitigation, and also adaptation. It considers how these climate clubs might adopt emissions trading or develop into carbon markets. In particular, it examines systems and services developed to enable the smooth functioning of individual Emissions Trading Schemes (ETSs), linked pairs of ETSs, and networks of ETSs coming together in various formations that can be described as Carbon Markets Clubs (CMCs). It analyses how these CMCs can be compatible with, and could assist the development of, climate clubs.

The paper reviews two notions of climate clubs in climate change studies—one that emphasizes incentives for participation and compliance, and another that focuses on size of membership as a key determinant of success. The two are not necessarily mutually exclusive, nor is either one antithetical to the universalistic United Nations Framework Convention on Climate Change (UNFCCC). A key challenge is to identify, assess and construct cost-effective combinations of complementary institutional modalities, including the UNFCCC, and the developing landscape of Carbon Market Clubs.

The concept of CMCs is still evolving. Preliminary analysis suggests that key aspects of the Paris Agreement can be seen as fostering new opportunities for the creation of novel international institutional modalities such as CMCs.

The paper discusses examples of organizations that include club-like features and carbon market programs or ambitions, and it also notes the numerous examples of climate change organizations that do not include such features or plans. There are also several scenarios for the evolution of the international landscape of climate change organizations over the next decade, which influence how CMCs could affect the development and design of climate clubs.

The report addresses several key questions: Are climate clubs more likely to find CMC systems and services more attractive than homegrown ones? Are there types of clubs that would only proceed to the creation of an emissions trading system (ETS) if CMC services were available? Would CMCs ease the passage to agreement between club members on ETS design and linkage? What would be the impact of CMCs on the potential formation of climate clubs?

Findings of the report include:

- The relative small size of climate clubs compared with large multilateral organizations may make agreement easier, in principle, in negotiations on club design and implementation issues. However, an explicit inclusion of criteria for participation and compliance can pose difficult issues that may inhibit consensus-building.
- Where climate clubs have retained their own measures of performance, or some specific metrics for the achievement of objectives, the translation into carbon units, and the assessment of the comparative worth of those units, poses some challenges.
- In view of the inherently multi-component nature of mitigation units, the potential for political friction over the adoption of external valuations should not be underestimated.
- "Not invented here" is a common and powerful factor already seen operating in ETS design; such a problem can be overcome when external systems have proved their worth and not picked up negative connotations, but that can take time.
- The debate on these questions takes place in a sort of vacuum: there are currently few examples of climate clubs on the verge of moving to inter-club trading.
- Examples of Climate Clubs examined include the Pacific Islands Development Forum (PIDF) being developed by the Pacific Small Islands Developing States, for which it is reasonable to ask whether joint moves to take climate-related action might extend to the formation of a Carbon Market Club. As a regional endeavor among a small number of economies it is fundamentally different from another climate club example examined in depth: the geographically extensive, sectoral agreement contemplated by the International Civil Aviation Organisation (ICAO).

The report includes some broader suggestions to help CMC development keep up with a rapidly developing background, taking the Paris Agreement into account and to update assessments of the literature periodically. And because the scenarios set out in the paper encapsulate diverse and dynamic policy developments that are subject to systemic shocks, they should be subject to periodic "reality checks" and adjustments. The annual World Bank

"Status and Trends" reports offer convenient occasions for doing this.

Several other topics will need further analysis. These include:

- assessing the CMC agenda in more detail in light of the Paris Agreement and consequential work by UNFCCC bodies, including implications of the Nationally Determined Contributions (NDCs) and their implementation;
- how to combine new institutional arrangements with the existing international institutional landscape;
- how to ensure coordinated functions among the UNFCCC and new arrangements;
- the possible creation of a club of countries with a minimum per tonne carbon tax and establishing a global benchmark social cost of carbon;
- business reactions to CMC concepts and specific design issues;
- political constraints at all levels on the development of CMCs;
- the full range of potential post-Paris clubs and the club propositions, or expectations of mutual benefit, that bring them together.

1. Introduction

1.1. Objective

The objective of this paper is to examine the possible relationships between climate clubs and systems and services developed to enable the smooth functioning of Emissions Trading Schemes (ETSs), linked pairs of ETSs and networks of ETSs coming together in various formations that can be described as Carbon Markets Clubs (CMCs). The paper examines the compatibility of CMC systems with different forms of climate clubs or club-like arrangements, and considers how climate clubs using CMC services could contribute to the development of carbon markets internationally and to climate change mitigation.

1.2. Focus

The paper focuses on: (a) how CMC components and infrastructure might assist those climate clubs that have shared emissions reduction or lower-emissions-per-unit-of-growth as an overt objective, and (b) club arrangements that include relatively small memberships and/or provisions for incentives that affect participation and compliance.

1.3. Structure

Section 2 of the paper presents the core concepts and messages of two strands of the club literature that have emerged in climate change studies. One emphasizes the size and membership structure of the club—i.e., the number of participants, such as governments, and the possible inclusion of other types of entities. The other emphasizes the availability of benefits by participating in the club and complying with its rules. Section 2 also illustrates key issues and options of club design with both climate and non-climate organizations, describes the current institutional landscape of the international climate regime and presents scenarios of potential future configurations of institutional arrangements.

In Section 3, the features of climate clubs and club-like arrangements are integrated into a discussion of CMCs initiative, including the potential of linkages among diverse entities. The emphasis is on how CMCs can contribute to the development of carbon market clubs. A wide range of issues, experience and consideration of possible future developments are all brought to bear on questions about: whether clubs are likely to find CMC systems and services more attractive than homegrown ones; whether there are types of clubs that would only proceed to the creation of an emissions trading system (ETS) if CMC services and systems are available; and whether CMCs would facilitate agreement between club members on ETS design and linkage issues.

The conclusions in Section 4 concern issues and options for CMC design, negotiation, and operation; implications for the World Bank and other international financial institutions; and topics for subsequent research.

1.4. Context

This report was completed in the immediate aftermath of the Paris COP21 agreement, while the implications of that agreement for the future of the international climate regime were being discussed intensively around the world. There has inevitably been uncertainty about how some aspects of the agreement will be implemented in coming years, but there is widespread belief that "a corner had been turned" toward a more favorable direction in the international negotiations. In this context, some uncertainty surely applies to questions about the implications of the Paris Agreement for the future of CMCs.

However, at least some of the implications can be postulated with confidence; the first is that there is nothing in the Paris Agreement to prevent moving ahead with CMCs. Beyond such a minimalist expectation it should be noted more broadly and positively that expectations about international efforts to address climate change have changed: there is perhaps more optimism and less pessimism than at any time in the past many years. The Paris agreement has offered a reinvigoration of international mechanisms against a background where it is clear that existing national commitments will not meet the agreed global objective. The stage is now set for a serious debate about how additional ambition could be achieved by nation-states—by acting abroad as well as at home. In sum, there is a more widespread recognition of the need for serious action and at the same time a stronger recognition of the potential value in international actions that can complement national actions. In particular, the broadly-framed Article 6.2 of the Agreement offers high-level encouragement for states and other entities to cooperate across borders and share the benefits of actions and policies that have the effect

of reducing carbon, which could incentivize both climate clubs and CMCs.

Yet, in the post Paris context there are also sobering reminders of constraints and challenges that lie ahead for CMCs, and those are discussed in detail below. There are, in particular, likely to be strong and diverse political pressures from many directions on efforts to develop CMCs.

2. Climate Club Concepts and Illustrations

This section considers in turn key characteristics of the two notions of climate clubs that have emerged in the climate change literature in Section 2.1; then examples of club features in both climate and non-climate international arrangements in 2.2; and finally the evolution of climate markets and climate market clubs, including their evolution to date, the current international institutional landscape, and scenarios for the future in 2.3.

The scenarios provide an analytic base and boundaries for the more detailed discussion in Section 3, where the connections of climate clubs to CMCs are explored.

2.1. Club Approach to International Organization Issues

Two notions of clubs have been emerging in analyses of international arrangements to mitigate climate change.[1] One addresses organizational issues generically, not including climate change in particular.[2] This notion emphasizes the role of benefits as incentives for participation and compliance. In order for the benefits to be effective in inducing participation and compliance, they must be shareable among complying participants and excludable to non-participants and non-complying participants.

The second notion has been receiving increasing interest as a way to avoid the negotiating constraints of the universalistic UNFCCC with its 196 participants (195 national governments plus the EU). Negotiations in smaller groups—with more interests and objectives in common—may achieve greater reductions in greenhouse gas emissions. The key issue in this approach is the size of whatever international arrangement is being considered—in particular the number of governments involved in negotiations and the prospective size of the arrangement.[3]

Both approaches can yield new arrangements that complement the existing multilateral UNFCCC core of the climate regime complex. Indeed, neither precludes further development of the UNFCCC. The central issue is finding combinations of diverse international institutional modalities that will yield cost-effective reductions in greenhouse gas emissions.[4] Climate clubs, in fact, can be developed as arrangements to supplement provisions of the UNFCCC and to implement elements of the Paris Agreement.

Though the two approaches to clubs are different in the features they stress, they are not necessarily mutually exclusive. Indeed, it is possible to design and negotiate a club-like arrangement that has the key features of both approaches, as noted further below in more detail. In this paper, we use both notions inclusively. There are, therefore, three possibilities: size-based clubs, benefits-based clubs, or a combination of both.[5]

2.2. Review of Recent Literature

The diversity of club studies is evident in the following illustrative publications:

Defining climate clubs in terms of their relatively small size, Weischer, Morgan and Patel (2012) identified 17 organizations that were founded between 1974 and 2012. The membership sizes ranged from 7 (Asia-Pacific Partnership on Clean Development and Climate, which was terminated in 2011), to 73 (REDD+). Most

[1] There is a brief review of the literature about clubs and climate change institutional arrangements in UNIPCC (2014: ch. 13). A more extensive review is available in Falkner (2015).There are important contributions by Victor (2011; 2015a; 2015b), Keohane and Victor (2011), Morgan, Messner and Schellnhuber (2014), Weischer, Morgan and Patel (2012), Andonova (2009), Andreasen (2014), Babiker (2005), Hovi, Sprinz, Sælen, and Underdala (2015), Kolln and Prakash (2002), Widerberg and Stenson (2013). Several items in the collection edited by de Coninck, Lorch and Sagar (2014) include references to clubs in the context of climate change issues, especially those by Garibaldi et al. (2014), Rossi (2014), and Brewer (2014). See Nordhaus (2015) and Keohane, Petsonk and Hanafi (2015a, 2015b) on carbon market clubs, and Keohane and Petsonk (2015) for climate clubs and the WTO. Ghosh, Vijayakumar and Ray (2015) and Ghosh and Ray (forthcoming) have formulated club construction lessons about applying the experience of technology transfer agreements to climate change.

[2] The literature of the first notion has its origins in Buchanan (1965). See Cornes and Sandler (1996) and Sandler (1997) for analyses of conceptual and empirical issues in this literature. See Brewer (2015a) for an application of this approach to a combination of climate and trade governance issues associated with Arctic black carbon emissions in international maritime shipping.

[3] The range of sizes that might be appropriate is discussed in Falkner (2015).

[4] See especially Widerberg and Stenson (2013) and Weischer, Morgan and Patel (2012) on the potential complementarity of clubs and the UNFCCC.

[5] Please note that one of the challenges of reviewing and using previous studies is that the usage of the terms is variable and not always explicit.

of them were concerned with energy issues. Most were independent of the UNFCCC, but some such as the International Partnership on Mitigation and Measurement, Reporting and Verification (MRV) were directly responsive to decisions at UNFCCC COPs. Many were high-level "dialogue forums" such as the G8 and G10, while others were "implementation groups" such as the Renewable Energy and Energy Efficiency Partnership.[6]

Ghosh, Vijayakumar and Ray (2015: Table 1, p. 5) list 39 [International] "Climate Partnerships"—of which 35 are engaged in "knowledge sharing and coordination," 16 in "technology transfer" in a narrower sense, 8 in "deployment mandates, standards and incentives," and 6 in "research, development and demonstration." Some are "forums for discussion" such as the Major Economies Forum on Energy and Climate; some are "forums for research and policy" such as the Climate Technology Initiative under the International Energy Agency; many have a regional focus such as the Asia-Pacific Economic Partnership Energy Ministerial; several are comprised of cities such as the C40; many have a specific technological or other focus such as the Carbon Sequestration Leadership Forum.

Hovi, Sprinz, Sælen, and Underdala (2015) conducted simulations derived from an "agent-based" model of club growth that takes into account a variety of conditions extracted from theoretical and empirical studies. They concluded that the growth and effectiveness in reducing emissions could occur if there were open membership, large incentives for members and freedom from conflicts over exogenous issues.

The most computationally-extensive published analysis of carbon-market clubs is by Nordhaus (2015). The conclusions are worth noting at length:

[He] finds that without sanctions there is no stable climate coalition other than the uncooperative, low-abatement coalition. This conclusion is soundly based on public-goods theory, on C-DICE model simulations, on the history of international agreements, and on the experience of the Kyoto Protocol. The analysis shows how an international climate treaty that combines target carbon pricing and trade sanctions can induce substantial abatement. The modeling results indicate that modest trade penalties [2 percent across all sectors] on nonparticipants can induce a coalition that approaches the optimal level of abatement as long as the target carbon price is up to $50 per tonne at current income and emission levels. The attractiveness of a Climate Club must be judged relative to the current approaches, where international climate treaties are essentially voluntary and have little prospect of slowing climate change (Nordhaus, 2015a: 1368).

Another recent extensive analysis by Keohane, Petsonk and Hanafi (2015b) addresses key issues about participation and compliance in a potential club of carbon markets (CCM). They suggest that a central requirement for membership would be the "capacity to administer a market—i.e., establish an emissions cap, issue and accept emissions units, require compliance, and penalize non-compliance." More specifically, they propose the following as "minimum eligibility criteria for membership . . .

- Emission targets defined as emissions budgets over some minimum duration, e.g., a decade, covering all or a significant portion of a jurisdiction's emissions of one or more greenhouse gases, denominated in tonnes of CO_2 or CO_2-eq.;
- The use of emission trading to meet the cap;
- Jurisdictional law requiring covered entities to comply; clear, sufficient penalties for non-compliance; and institutional capacity to enforce the cap; and
- A commitment to transparent monitoring, reporting, and verification of emissions and transactions."

As for its institutional-legal status, it could be a voluntary association, not necessarily a treaty; and it could be constituted either inside or outside the UNFCCC. In any case, three lessons to be applied from the history of the development of the trade regime and other international organizational experiences are to: 1. "start small and use market access as an attractant;" 2. "choose a legal architecture that facilitates participation;" and 3. "seek critical mass." These and other issues are developed in detail.

2.3. Examples from Climate Change and Other International Organizations

A sample of cases of special relevance to CMCs has been selected to illustrate the range of international arrangements with at least some features of clubs. The sample has been chosen to include the following criteria: regional diversity, sectoral coverage, size (in terms of economies and emissions), and level (international, subnational, transnational). All involve international connections.

[6] A survey of climate clubs by Andreasen (2014) found that they were mostly "discussion" forums, which were not more effective than the UNFCCC in promoting international cooperation to reduce emissions.

In addition to the organizations where there are carbon markets already in place or under development, there are other club-like climate change organizations that do not include any carbon market provisions or even apparent intentions to develop any. Indeed, these significantly outnumber those with operational or expected carbon market programs.[7]

World Trade Organization (WTO)

Among existing economic organizations with club-like features, the WTO is of special interest because it has evolved into a large club with smaller clubs embedded within it, though it also has features of a multilateral institution with its 161 members and makes many decisions on the basis of a consensus of all members. WTO membership (and the benefits thereof) requires that applicants' policies qualify for *participation* in various specific agreements such as GATT, GATS and others, and *non-compliance* is penalized by enforced compensation of "winners" by "losers" in Dispute Settlement cases.

The Environmental Goods Agreement (EGA) is a plurilateral negotiation in progress as of the end of 2015 among 17 WTO members (one of which is the EU-28) that is expected to be multilateralized within the WTO if/when the negotiations are completed; the goods whose tariffs are being negotiated include climate-friendly goods such as wind turbines.

The Information Technology Agreement (ITA) is a plurilateral agreement to be multilateralized within the WTO. Its list of covered goods was expanded by an agreement in December 2015 that includes 201 products. The IT goods whose tariffs have been reduced to zero—or will be reduced in increments according to the 2015 agreements—include IT components for energy efficiency and other clean energy controls, as well as other climate-friendly goods.[8]

The following arrangements that have been selected for analysis are not a representative sample of all climate change organizations. Rather, they are a small but diverse subset of particularly club-like groupings, where carbon markets are in operation or might be within a few years. Here we present brief descriptions summarizing their basic institutional features and current status. More detailed analyses of the NCM-specific issues concerning them and some other, less obviously club-like, examples are discussed in Section 3.

EU ETS and Energy Policies, Including Carbon Taxes

The EU ETS represents the largest and most developed climate club, with 31 national governments as participants (28 EU members plus Norway, Liechtenstein and Iceland). It is currently engaged in a reform process announced in July 2015 by the Commission and considered by the members' environment ministers meeting as the Council of Europe in October 2015. It is an interesting case for analysis because it combines a range of energy policies with an ETS and because it is reconsidering many aspects of its policies and programs including its emission targets for 2020, carbon leakage/international trade and investment, finance, and others. A reformed system could be in force as early as 2017. There are also many national carbon tax systems (see Secs. 2.4.1 and 3.4.1).

Western Climate Initiative

The Western Climate Initiative (WCI) is a North American transnational arrangement among subnational entities—California, British Columbia and Quebec. In the years following its establishment in 2007, its membership included as many as seven US states and four Canadian provinces, with six Mexican states as observers. The WCI no longer includes several previously affiliated Canadian provinces, Mexican states or US states. Nevertheless, it remains an important part of the landscape of organizations with carbon market or other climate change interests in

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[7] Among them are: Cities for Climate Protection, Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants, and Major Economies Forum on Energy and Climate.

[8] Examples from other economic organizations include: IMF members have to contribute variable amounts for quotas in order to participate. Non-compliance in the form of "arrears" on outstanding loans prevents further borrowing. Eurozone members have to meet fiscal criteria to participate in the benefits of belonging to a single-currency zone; members can be expelled for non-compliance (though the precise criteria and process may be ambiguous). The five organizations comprising the World Bank Group have varying memberships and varying policies concerning compliance and penalties for non-compliance—namely the International Bank for Reconstruction and Development (IBRD), the International Development Association, the International Finance Corporation, the Multilateral Investment Guarantee Agency and the International Centre for Settlement of Investment Disputes (ICSID). The membership of the IBRD is 188; there are only 127 members of all five organizations. The participation and compliance rules vary among the five organizations, but all have restricted participation on the basis of some criteria—such as paid-in capital (IBRD), or have rules about compliance such as having to enforce arbitral awards (ICSID), or have to make annual contributions to participate and gain the benefits. Non-compliance in the form of "arrears" on outstanding loans can prevent further borrowing; participation in the benefits of borrowing is also limited by the "conditionality" of loans.

view of the large size of the combined economies and GHG emissions.[9] (Also see Sec. 3.4.1.)

RGGI

The Regional Greenhouse Gas Initiative (RGGI) of northeastern states in the US is limited to electric power facilities, of which there are 168. Its origins can be traced to 2003, when the governors of Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont began discussions to develop a regional cap-and-trade program to reduce carbon dioxide emissions from power plants. In 2005, seven of those states—not including Massachusetts or Rhode Island—announced an agreement to implement the RGGI. In 2006 the seven states began the establishment of a regulatory framework for the development of individual state regulatory and/or statutory proposals. In 2007, Massachusetts and Rhode Island, which had participated in the early development of RGGI, signed on to the RGGI plan, as did Maryland later the same year. By the end of 2008, ten states completed their individual rulemaking processes, and the first compliance period for each state's linked CO_2 Budget Trading Program began on January 1, 2009. New Jersey's Governor announced his decision to quit RGGI in 2011, though legal challenges to the process continue.

A recurrent issue about RGGI and the WCI—at least tacitly if not explicitly—has been whether the two systems could be merged. The issue is considered in more detail below in Section 3.4, where both the WCI and RGGI are discussed in the context of CMC-specific issues.

Pacific Islands Development Forum (PIDF)

A coalition of fourteen Pacific island states, the Pacific Small Islands Developing States (PSIDS), has been working to put in place the foundational elements for green growth and sustainable development in their economies.[10] In 2012 they approved the establishment of the Pacific Islands Development Forum (PIDF) to engage leaders in implementing cross-sectoral green economic policies.[11] In subsequent years they have held summits that include government, private sector and civil society representatives. The third summit in September, 2015, focused on "Building Climate Resilient Green Blue Economies." The groundwork for the formation of a more highly developed international organization has also begun.

With a regional structure for green growth in place—and a preliminary interest in establishing associated carbon markets[12]—the next focus could be on furthering the establishment of national and sub-national structures. At all levels institutional arrangements are likely to reflect the collective, inclusive nature of Pacific cultures, with private sector and non-state actors such as those represented by civil society organizations, as well as governmental representation.

The Majuro Declaration on Climate Leadership foretold the development of the Intended Nationally Determined Contributions (INDCs) that became part of UNFCCC process.[13] Seven PSIDS countries have made commitments of zero carbon emissions or carbon neutrality by 2050 or before: Cook Islands, Nauru, Niue, Papua New Guinea, Republic of the Marshall Islands, Tuvalu and Vanuatu. Five countries have made commitments of significant reductions in emissions: Federated States of Micronesia, Kiribati, Palau, Samoa, and Tonga.[14]

Emissions in the transportation sector pose key challenges in the pursuit of carbon reductions. Fossil fuels in the transport sector are predominantly focused on maritime and air transport, with land transport representing a significantly smaller proportion. There is therefore a high likelihood of not meeting long-term emission reduction goals without addressing shipping and air transport. In

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[9] The state of California, it is commonly noted, would be among the ten largest national economies in the world if it were a country, and it is correspondingly a major emitter.

[10] The discussions of the PDIF here and in Section 3 are based on a background paper prepared by Holland (2015). The 14 Pacific Small Island Developing States (PSIDSs) are: Cook Islands, Fiji, Federated States of Micronesia, French Polynesia, Kiribati, Nauru, New Caledonia, Papua New Guinea, Republic of the Marshall Islands, Solomon Islands, Timor Leste, Tonga, Tuvalu, and Vanuatu.

[11] http://pacificidf.org.

[12] The strong push for REDD+ and the creation of forest replanting opportunities is the best evidence. The countries leading the Pacific push in this direction are Papua New Guinea, Fiji, Solomon Islands and Vanuatu, 4 of the 5 countries of the Melanesian Spearhead group (MSG). The push is available in the transcripts of the UNFCCC COP21 negotiations. The PM of Niue has also expressed interest in e-mail dialogues. The other countries do not have clear positions on REDD+ because they do not have enough forests to store large amounts of carbon. It is a topic mentioned in the green growth documents developed, including the MSG and Fiji green growth documents.

[13] The Republic of the Marshall Islands led the way with the Majuro Declaration on Climate Leadership. See http://www.majurodeclaration.org.

[14] Timor Leste did not participate in the Majuro meeting, as it was not yet part of Pacific regional bodies, and French Polynesia is still considered a French territory. The commitments are made at the national level and not at the territorial level.

view of these transportation challenges, the Republic of the Marshall Islands—which is a flag state for the third largest ship registry in the world—proposed to the International Maritime Organization (IMO) a statement "calling for a quantifiable reduction target for greenhouse gas emissions from international shipping";[15] the resolution was defeated, however. (Also see Sec. 3.4.1.)

ICAO

Along with the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO) has been designated by the UNFCCC to be the principal international organization for addressing climate change issues in its transport sector. These two international transport sectors, of course, produce a large portion of their emissions outside the national territories of UNFCCC signatories, and they thus pose distinctive emissions monitoring, attribution and regulation issues.

Although the IMO has been generally more active for several years in addressing carbon emissions issues than has the ICAO, the ICAO has recently agreed to develop a voluntary "market based mechanism" (MBM). The ICAO club is a club of nations, but with very close links to the relevant business entities—with some (initially weak but strengthened) climate objectives, still forming only a small and ancillary part of the full set of club objectives. After considerable pressure from the UNFCCC and elsewhere, and many years of internal debate, it seems finally to be turning towards emissions trading to help achieve those objectives. Key design elements, however, are not to be decided until 2016 and are not planned to be in force until 2020.

More detail on ICAO and its potential relevance is at Section 3.4.2 and Annex B.

2.4. Evolution of Carbon Markets and Carbon Market Clubs

2.4.1. Evolution to Date

The history of governmental carbon pricing schemes can be briefly summarized in terms of three phases (derived by the authors from Organisation for Economic Cooperation and Development and World Bank Group 2015: p. 12, Fig. 2): (1) In the early 1990s, carbon taxes were established by Poland (in 1990) and four Nordic countries (Finland in 1990; Sweden and Norway in 1991; Denmark in 1992) and then shortly after by the three Baltic countries (Latvia in 1995; Slovenia in 1996; Estonia in 2000). Thus, by the beginning of 2005, there were eight northern European countries with national carbon tax systems. (2) The advent of the EU ETS in 2005 marked the beginning of the second phase, during which Canadian provinces, Japanese cities, US states and a few other subnational entities launched emission trading or carbon tax systems. (3) In the 2012–2015 phase, both emission trading and carbon tax systems spread geographically, especially (but not only) in Asia.

By mid-2015 there were about 40 national and 20 sub-national carbon pricing programs in effect with others planned for implementation during 2016–2017. Some jurisdictions (particularly in northern Europe) had both an emission trading scheme and a carbon tax in place. There were, of course, emission trading systems with multiple participants—e.g., 31 countries in the EU ETS and 9 US states in the Regional Greenhouse Gas Initiative (RGGI). Several initiatives were in a state of flux—e.g., 7 subnational pilot programs in China were slated to be integrated into a prospective national program.

2.4.2. Current International Institutional Landscape

The current array of carbon markets exists within the context of a much broader array of diverse types of international arrangements, which have been encapsulated by the term "climate regime complex" (Keohane and Victor, 2011). A useful summary of the current landscape is represented in Figure 1 taken from the recent IPCC report's chapter on "international cooperation" (IPCC 2014: p. 1013, Fig. 13.1). The figure is—it should be noted—illustrative, not comprehensive.

Within the context of this extensive "regime complex," the existing array of emissions trading systems, carbon tax systems and emission offset programs is also diverse, and includes national, subnational and regional entities in nearly all areas of the world.

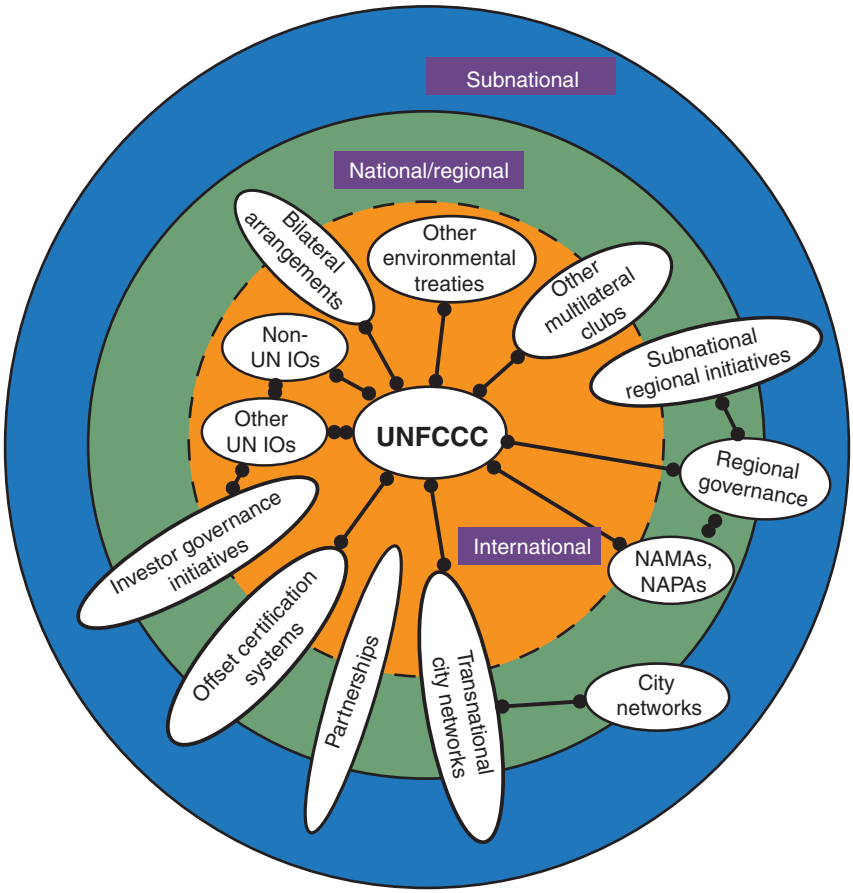
2.4.3. Scenarios of the Future

Although the following scenarios, like most scenarios, are not intended to be precisely predictive or prescriptive, they can nevertheless be useful analytic tools to posit plausible circumstances in which carbon clubs may emerge over the next decade or so.

The possibility of "shocks" that could derail progress on the development of a climate club or linkages between

[15] http://www.imo.org/en/MediaCentre/MeetingSummaries/MEPC/Pages/MEPC-68th-session.aspx.

Figure 1: Diagrammatic Summary of Current International Institutional Landscape for Addressing Climate Change



Source: IPCC (2014: p. 1013, Fig. 13.1)

carbon markets should of course always be kept in mind, as discussed in Subsection 2.4.4. Within those contextual possibilities, the following scenarios are focused specifically on a range of possibilities that establish analytic boundaries for addressing the many detailed questions considered in Section 3.

A useful way to make the development of scenarios feasible and focused on large emitters is to note the data about the sources of greenhouse gas emissions in Table 1.

China, the EU and the US accounted for roughly half (42%–56% depending on the indicator used). Among other contributors, about one-fifth of the world total of all GHGs was contributed by five countries: India, Russia, Japan, Brazil, and Indonesia. The big 3 plus the next 5, therefore, together contributed about two-thirds of the world total. For carbon dioxide, in particular, India, Russia, Japan and South Korea contributed about 17%; the big 3 + 4 thus accounted for nearly three-fourths of the world total.[16]

Summaries of announced INDCs with carbon market provisions in them are displayed in Table 2. If they are taken at face value, the only significant change is China's

[16] Whether and how black carbon emissions should be included is an open question. In total, they are the second most important contributor to radiative forcing after carbon dioxide (Bond et al. 2013); however, because it is particulate matter and not included in UNFCCC or EU ETS or other carbon market schemes, it is beyond the scope of the present study.

Table 1: Major Contributors to Greenhouse Gas Emissions (percent of world total)

Countries	All GHGs CO_2e, 2012 Excluding Land Use Change and Forestry	All GHGs CO_2e, 2012 Including Land Use Change and Forestry	Only CO_2 Emissions, 2011
China	24	22	28
European Union (28)	10	7	11
United States	14	12	17
Subtotal	48	42	56
Others	52	58	44

Source: Computed from www.wri.org, accessed on 22 October 2015

Table 2: National Carbon Market Provisions for 2020 INDCs Submitted in 2015

Countries	Provisions for Carbon Markets
China	Yes
European Union (28)[a] + Iceland, Norway, Liechtenstein	Yes
United States	No national. See WCI and RGGI in Sec. 3.4.1
India	No
Russia	No
Japan	No national. See BOCM in Sec. 3.4.1
Brazil	No
Indonesia	No
Of 167 countries (in 140 submissions) submitted by 18 November 2015	32 (EU 28 + 3 + China)

[a] *Negotiations between Switzerland and the EU are pending.*

Sources: UNFCCC (2015); WRI (2015)

plan to take into account lessons learned from their seven subnational pilot systems and introduce a national ETS.[17]

Three scenarios have been developed.

In Scenario I, there is an expansion in China from the present seven subnational pilot projects to the basic elements of a national emissions trading system that begins operation in 2017, as planned, or within a year or two after that. Otherwise, there are marginal expansions—including a mixture of Canadian and US subnational ETSs joined together in transnational arrangements including California as the dominant participant in one and an expanded RGGI in the other. In this scenario, the EU ETS continues, with marginal changes such as more active and more thoroughly monitored involvement of one or more of the East European members. In this scenario, there will be only marginal expansions in the rest of the world, with a limited aviation ETS.

In Scenario II the China emission trading system is fully developed, and there is a significant expansion of transnational emission trading schemes in North America. There is also a more extensive aviation ETS.

In Scenario III there is no national Chinese system; there is a diminished EU ETS; there is no aviation system or other new systems.

The scenarios are represented in Table 3 below.

These scenarios only represent the broad outlines of potential *evolutionary paths* for the next decade or so. They do not necessarily represent institutional configurations that are specific to 2025 in particular. There are numerous issues and options for a wide range of specific design features that will be significant elements of the carbon market agenda and the formation of climate clubs and links between carbon markets.

Carbon market clubs (CMCs)—meaning separate carbon markets that come together and share features, rules and services—will evolve within the context of developments outlined above—namely the broad array of diverse international arrangements comprising the climate change regime complex; the club-like institutions that are climate-relevant and that are already in existence; the major emitters; and the implementation of INDCs that contain provisions for carbon markets, as notified to the UNFCCC.

With the Paris Agreement in place there is likely to be a willingness to explore new complementary arrangements that augment UNFCCC activities and programs, including clubs and club-like arrangements, with a window of opportunity during 2016—and perhaps beyond—to advance analysis and dialogue about this agenda.

Table 3: Key Features of Decadal Scenarios

	China	US and Canada	Europe	Rest of the World
Scenario I	Basic elements of national cap-and-trade system in place	Marginal expansion of existing transnational arrangement among subnational entities	Marginal expansion of EU ETS	Marginal expansions, including new but quite limited aviation ETS
Scenario II	Highly developed national cap-and-trade system in place by 2017–2019	More extensive transnational ETS including more US states, Canadian provinces and perhaps Mexican states	Marginal expansion of EU ETS	Marginal expansions, plus new extensive aviation ETS
Scenario III	No national ETS in place	Contraction of WCI	Contraction of EU ETS	No new system and no aviation ETS

[17] Of 147 INDCs analysed by Obergassel and Gomik (2015) the number of countries intending or considering using international market mechanisms were respectively 69 and 20, with CDMs being the most common.

The exploration of new institutional modalities would be consistent with the legal provisions of the UNFCCC. In particular, there are embedded in the UNFCCC itself, in Articles 4 and 12, specific multilateral legal endorsements of international cooperative ventures outside the UNFCCC framework.[18]

2.4.4. Shocks: Structural, Political and Other Potential Constraints

The evolution of CMCs will be dependent, of course, on the broad range of structural features of the international institutional landscape depicted in Figure 1, as well as significant political, economic and technological conditions that impinge on the immediate circumstances and specific features of CMC arrangements.

These contextual conditions are unlikely to evolve in linear fashion; in fact, it is reasonable to suppose that there will be "shocks"—both positive and negative—that will periodically alter the opportunities for developing CMCs. Negotiating impasses in one or more UNFCCC processes that spill over into other domains such as linkages among carbon markets are examples.

The results of national elections in Canada and the US are likely to be fundamentally important in North America, as are the results of the UK referendum on membership in the EU (and indeed the political landscape in other major EU members). Further, economic slowdown in China and/or globally could also clearly affect the evolution of the climate regime complex, including CMCs. Also important will be key technological innovation and diffusion processes, such as carbon capture and storage for electric power plants. (Also see Secs. 3.5.2 and 3.5.3 on implications of the Paris Agreement for the NCM initiative.)

[18] UNFCCC Article 4 (2) provides that "These Parties [i.e., developed country Parties and other Parties included in Annex I] . . . may implement such policies and measures [[insert clarifying phrase]] jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention . . . The developed country Parties and other Parties included in Annex I commit themselves specifically as provided for in the following: (a) Each of these Parties shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention, recognizing that the return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification, and taking into account the differences in these Parties' starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances, as well as the need for equitable and appropriate contributions by each of these Parties to the global effort regarding that objective. These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention. . . ." UNFCCC Article 12 (8) provides that: "Any group of Parties may, subject to guidelines adopted by the Conference of the Parties, and to prior notification to the Conference of the Parties, make a joint communication in fulfilment of their obligations under this Article, provided that such a communication includes information on the fulfilment by each of these Parties of its individual obligations under the Convention."

3. Linking the NCM Initiative to Climate Clubs

This section looks at the relationship between existing (and emerging) climate clubs and carbon trading. It considers how systems and services developed for one or more ETS could be useful to climate clubs and whether there are any special features of trading within clubs that would make the attractions of such systems and services different for climate clubs. It addresses the perspective of jurisdictions and club organizers, and the perspective of market players. It makes some in-principle points about particular trading services that have been proposed; and concludes with an assessment of the relevant impacts of the Paris Agreement.

3.1. From Clubs to Markets

As the former section demonstrates, there is much diversity in the types of climate or climate-related clubs along many dimensions. Categorized by objectives, we can find examples of the following types among existing arrangements and negotiations in progress.

- Knowledge sharing and coordination—IEA Multilateral Technology Agreements and Implementing Agreements
- Technology transfer—Global Green Growth Institute (GGGI)
- Technology deployment, standards and incentives—Low Carbon Technology Partnerships initiative (LCTPi)
- Research, development and demonstration—Carbon Sequestration Leadership Forum (CSLF)
- Increasing trade in climate-relevant goods or services—Environmental Goods Agreement (EGA); Asia Pacific Economic Cooperation forum (APEC)
- Joint or aggregate carbon emissions reduction, absolute or relative—Global Methane Initiative (GMI); Climate and Clean Air Coalition to Reduce Short-lived Climate Pollutants (CCAC)
- Reductions in other pollutants, or in energy use, with ancillary carbon consequences—Clean Energy Ministerial (CEM)
- Investment facilitation—Renewable Energy and Energy Efficiency Partnership (REEEP)

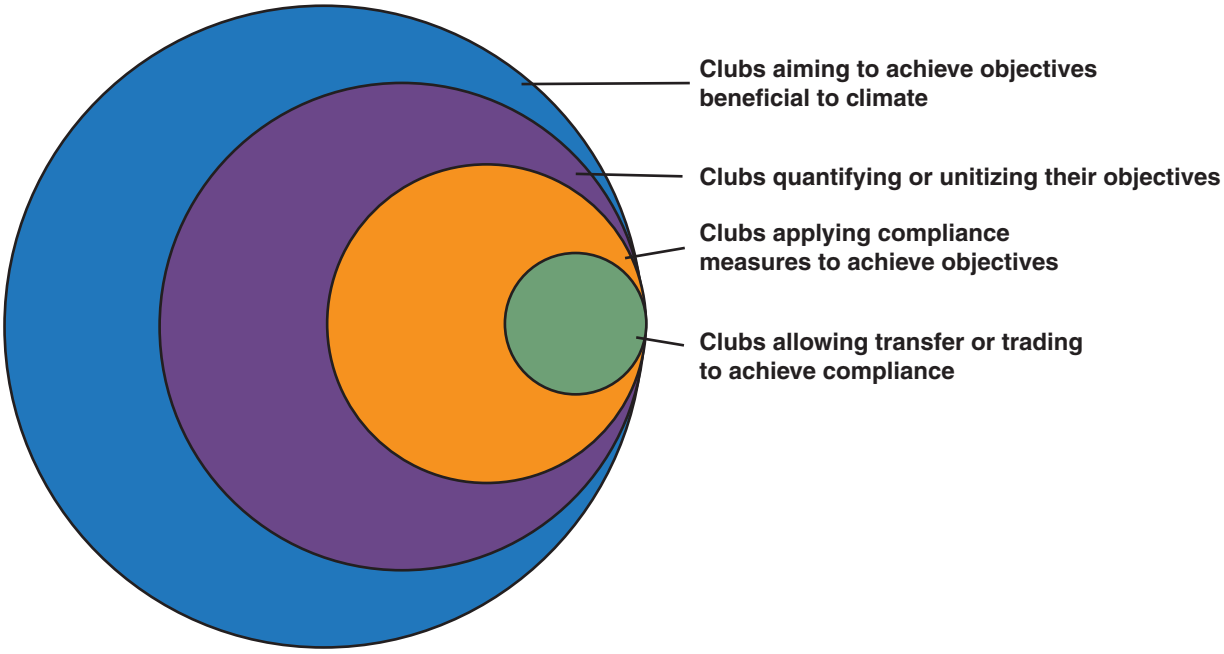
To identify those that could be of interest to CMCs, we need to apply a number of filters. Only some clubs (the minority) identify their objectives in quantified or unitized terms, or even periodically assess quantities of objective achieved. A smaller number of this reduced set address the achievement of objectives in terms of compliance by individual members and enforcement in cases of non-compliance, whether by consideration of the justification of continued membership of the club or through other sanctions or levers.

The next filter is the number of such clubs that accept the notion of mechanisms to achieve the overall objective by transfer, purchase or trading of units between the club members. So let's examine how NCM elements can be attractive to clubs, and even incentivize some of them towards pricing and trading solutions.

3.2. Carbon Market Clubs and Their Influence on Climate Clubs

As the world becomes populated by different carbon market and trading systems, different types of linkages between those systems have also been identified and in some cases developed. The Kyoto Mechanisms provided an overarching framework for national trades and reduction units which remains partly in place even after the Paris Agreement. *Direct* linking between one jurisdiction's trading system and another's has been achieved for Norway and Switzerland and the EU ETS, and between California and Quebec. It is being prepared for Ontario's inclusion in Ca-Qb, was considered at an early stage for Australia and New Zealand and was planned in some detail for Australia and the EU ETS. *Indirect* linking has been achieved through the multi-jurisdictional acceptance of offset units, particularly CERs and ERUs. Market players tend to create their own indirect links, independently of Governments, as they create hedging strategies for investors or compliance entities looking at their net positions across several markets. *Restricted* linking has occurred when ETSs have accepted some but not all offset types, and is potentially attractive to jurisdictions where political and other reasons for caution make them want to limit the extent to which units can flow freely between linked systems—by quotas, discount rates and exchange rates. Every linkage, of any type, that is implemented, proposed or discussed creates or enlarges a Carbon Market Club. It facilitates a move towards worldwide carbon pricing and offers new examples or services that could be used by jurisdictions or clubs that are considering moving to a trading system. Assesing ETS units in the currency of another jurisdiction, or some common methodology to assess global carbon value or mitigation value; insurance or pooling systems to reduce

Figure 2: Filtering the Climate Clubs to Get Closer to Pricing



risks associated with certain unit types; operational market systems such as platforms and registries: these and other facilities could be very helpful in forming climate-club-based trading systems and assisting national or regional carbon trading systems to link with each other. These facilities are described in this paper as Carbon Market Club (CMC) systems and services. They reduce the overall economic cost of systems and linkages, reduce the barriers to entry and transaction costs for new trading systems, and clarify or at least quantify difficult and invidious questions of comparability of effort in mitigation, and therefore comparative value of system units. If effective CMC systems and services are developed and standardised, and become familiar to trading stakeholders globally, the world may move closer to a worldwide trading system which is wider and more durable than the UNFCCC Kyoto Mechanisms.

3.3. Will Climate Clubs Use or Be Affected by Carbon Market Clubs?

Our principal task in the present study is not so much to assess the probability of present and future individual trading systems taking advantage of CMC systems and thereby moving, or moving faster, towards participation in a genuinely networked market. Rather it is to consider whether there are special features of climate clubs that would make their responses to CMC systems, and thus their probability of using them, significantly different from existing or imminent carbon trading systems considering linking.

In general, this is not an economic question. The economic benefits of CMCs to jurisdictions operating or considering a trading system with elements of linking are broadly the same irrespective of whether the jurisdiction is a single national government or a club of governments or other entities. There are economic issues of scale of the system. Many of the benefits of trading come from increasing the pool of emissions reductions, meaning that a low number of compliance entities poses problems for an ETS, and linkage is of more value for such an ETS than for a large one. For any ETS, expansion that allows compliance entities to access a bigger pool of abatement opportunities will be economically beneficial, the more so if marginal abatement costs across the expanded system reduce significantly. The benefit is the greater if the unexpanded ETS's price is high or expected to rise. ETS expansions of this type also have potential for climate benefits if the benefits allow greater ambition in the ETS' underlying targets.

But these are drivers for increasing scale in an ETS, which can be achieved by a variety of means: it does not apply particularly to an existing club, or to make jurisdictions want to form or make use of a club rather than undertake

direct links to other ETSs or offset systems. The key questions for the present study appear to be rather:

- Whether there are types of CMCs that might offer elements that would be more **technically** difficult or expensive in transaction cost terms than a single jurisdiction to create on its own?
- In particular whether there are types of clubs which **would only proceed** to using a trading system if it was clear to their members that significant elements of a trading system could be taken more or less off-the-shelf from an existing ETS or CMC, thus reducing the scope for complex argument and negotiation between members?
- Whether there are types of CMCs that might ease the passage to **political** agreement between climate club members on aspects of a trading system in design and operational phases, including linking decisions, or otherwise aid the club's decision-making processes by its independence and "third-party" status? Would it be politically more feasible to retain heterogeneity or make systems homogeneous?

These are largely political questions, and theoretical at that, but it is nevertheless possible to address them.

3.4. Intra-Club and Inter-Club Linkages

Given our suggested hierarchy of the different types of clubs (3.1), what types of CMCs are likely to form?

3.4.1. Existing Climate Clubs with ETS or Markets

Let us start with the most obvious—the carbon trading clubs that are already in existence, which have been developed to some degree and then stalled, or are obvious possibilities for the future.

EU ETS

The EU is a form of climate club, and the process of creation of the infrastructure of its emissions trading scheme, at a time when international systems were being created by the UNFCCC for the implementation of the Kyoto mechanisms, is instructive for our present purpose. The desire to keep control of structures and institutions in the EU (and preferably Brussels) was very strong, and relationships at working level between the relevant parts of the Commission and the UNFCCC secretariat suffered some strain. From the UNFCCC perspective, the EU seemed bent on creating a system that duplicated or substituted for some of the trading structures (registries, offsets) that were being created worldwide for the Kyoto mechanisms.

They were also introducing decision points that meant that some EU countries might be likely to make less than full use of the Kyoto mechanism. And the very philosophy that led the EU to create a single European system rather than allow member states to create their own, including economy of scale, seemed to disappear when they considered the pros and cons of a fully international system.

One part of the EU response to these concerns, even if not clearly articulated in public, appeared to be lack of confidence that the Kyoto mechanism system would actually work in practice or be sustained in the long term (not wholly unreasonable at the time) and the danger of frustration of an important EU policy if it did not. Another part was the attraction of the ancillary benefits for EU economic and energy governance that seemed possible with a EU-centric trading system. But a third part was a simple preference for keeping the levers of a system that could cause political controversy in the EU in European hands.

The way Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) were treated in the EU ETS showed this concern. Firstly there was the unwillingness to allow the decisions of the CDM Executive Board (and Joint Implementation Supervisory Committee—JISC) to be the sole arbiter of acceptability in the EU ETS. Then there were complex surrender rules effectively establishing quotas for the use of allowable offsets. And then there were reductions in the previous scope to use CERs in the EU ETS firstly for reasons of local political concern about environmental integrity, subsequently because of EU desire to use the instruments as a negotiating tool with developing countries in order to increase their mitigation ambition, and finally as part of the EU's only immediately available responses to an oversupplied EU ETS system.

In all these cases, strict economic logic, fairness and reduction of transaction costs were not the primary decision factors. Nor have these been the only issues in the discussions of EU ETS linking held with Norway, Switzerland, Australia, California and others. So it is reasonable to assume that the idea of handing over to a non-EU system the assessment of the value at which the EU ETS "should" accept units from other jurisdictions, even if the choice of the jurisdictions (or separate mitigation project systems) remained an EU one, would not be uncontroversial—and that is an understatement.

The same applies, with perhaps lesser force, to reserve or insurance systems, and to market services. The managing and regulation of the EU ETS markets, at national and European levels, has been the source of a great deal of

complex negotiation and decision making. On the basis of those regulations effective platforms and systems for trading and settlement have been created largely by the private sector. It is hard to see there is room for adoption of non-EU systems except perhaps in the circumstance of a revolutionary change in EU ETS design. As for the International Reserve, although the risks to which it is addressed exist in the EU context, and are perhaps increased by the new Market Stability Reserve, the possible confusion about the achievement of the EU's own targets in circumstances where non-EU assets were used in the system may mean that EU authorities would approach the idea of using an international reserve with great caution.

Given that an EUA from Luxembourg is valued, in the EU ETS system, exactly the same as one from Greece, it is also interesting to consider the way that "burden-sharing," or the distribution between EU member states of mitigation contributions making up the total reduction target of the EU, is handled there. It could be argued that the issues taken into account, including the necessity of strengthening ties between member states ("cohesion") and to make allowances for special national economic factors, equate broadly to the assessment methodologies that have been suggested for common carbon value or mitigation value. However, any suggestion in EU debates that particular national policies cannot, in advance, be trusted to deliver as the member state proposed is rarely encountered and tends to be divisive. What is absolutely clear, however, is that the burden-sharing decisions are highly political ones, involving much lobbying and special pleading; they are not just handed over to a special commission of independent experts.

Finally, there is a point to be made about the size, history and pride invested in the EU ETS. In general it is self-sustaining, fully-organized and regulated, well-funded and not (in the minds of its administrators and most Government members of the "club"), in need of borrowing design elements from outside. Against that, the continued EU climate policy of promoting trading across the world ought to make it sympathetic to the creation of the CMC systems and services. But whether that would extend to using external mitigation values and risk-reduction tools in its own ETS is another matter. This factor applies, to some extent, to all well-established clubs.

WCI

The California-Québec linking within the context of the WCI (and the prospect of Ontario to come, and maybe now a Canadian Federal element and Mexican participation) is clearly the best current evidence for the possibility of linkage between trading systems as a result of political will overcoming detailed economic and administrative difficulties. So the question for current purposes is whether the linking decision and various scheme design issues would have been easier if common systems and facilities had been available. Perhaps the biggest gesture of political faith is the Ca-Qb decision to go for full linking, in the sense of accepting each jurisdiction's emissions reduction units at full value, without any detailed process of assessment to see whether the units represent and continue to represent an equal mitigation effort or should be indexed or discounted against each other. In this way, the group has so far side-stepped one of the key translation protocol issues. When it comes to offsets, broadly each jurisdiction has put its faith in the other's assessment systems, perhaps relying on the comparable offsets quota in each jurisdiction to guard against some of the risks, environmental integrity or other.

Reserve or insurance facilities and common settlement systems, on the face of it, could have been more useful, though the difference in the reserve systems in California and Québec may indicate that the intense debates about the degree of protection to Government and compliance entities had a local character that might not easily be sacrificed to an international reserve arrangement.

RGGI

RGGI is a comparatively small system, with currently 168 utilities-only compliance entities operating in an established and regulated market. There are provisions for offsets, within a tight quota system. But while project protocols exist no projects have been developed yet under RGGI, reflecting the relatively relaxed economic impact on compliance entities, although this is beginning to change. There is also a cost containment reserve. The governance system is in principle somewhat more collegiate than that of the EU ETS, as RGGI is driven in law by a set of State rules that follow the RGGI model rule. In practice RGGI Inc has significant practical independence or power to propose, but the possibility of State differences over possible changes to the model rule or other design features allows space for inter-jurisdictional argument comparable with the EU ETS; though political views of RGGI among the members have, excepting the exit of New Jersey, so far been more aligned than those of EU Member States.

RGGI is in principle open both for new members, and trading with other states or regions, and expansion forms part of the issues under consideration in the 2016 Program review. Adding sectors to the power sector is conceivable, but would be a larger step, and it is notable that the possibility of a trading club of transport emissions

or allowances is being discussed by a number of RGGI States (and DC) as a separate initiative, not an expansion of RGGI. International linkages would be perhaps be one step further, raising questions of State competence as well as environmental integrity: concerns about international offset integrity led to them being excluded from RGGI flexibility mechanisms in the 2012 Program Review.

Taking the CMC elements in turn, RGGI, like the EU ETS, has implicitly accepted that all its members' allowances have equivalent value. Questions about the comparative ambition and environmental integrity of the State allocation budgets, and the feasibility of achieving emissions reductions, have been internalized in RGGI's inter-State budget allocation system, adjusted by experience of auctions and in particular of emitter behavior in banking allowances. An external assessment of carbon or mitigation value might conclude that, say, Connecticut's allowances had a higher value than Delaware's, but the RGGI system uses its own budgeting to ensure adequate comparability. If the possibility arose of linking to jurisdictions or sectors that could not be included in such a budgeting process, then outsourcing the answer to the question "how do we know the units are of comparable value?" should in principle be interesting. But there would need to be trust in the external source's methodology, and there are many other considerations about such linking that would need to be dealt with first.

RGGI is confident in its offset systems, though they have not yet been tested, so the notion of adding an environmental integrity insurance system could at present be a hard sell. As for insurance of its price control systems, the RGGI states have accepted that they have not created an absolute ceiling; nevertheless the operation of the cost containment reserve is under discussion in the 2016 Program Review, and a central reserve of allowances could theoretically be of interest in answering questions about how current levels of price containment could be assured if there was linking to an external system.

RGGI is a working market; it has an effective registry (COATS), market monitoring (by Potomac Economics), auction platforms (currently outsourced to World Energy Solutions), secondary markets and derivatives, liquidity providers, etc. Despite the acceptance of outsourcing, it is hard to see any of these systems being easily replaced by, or absorbed into, a wider international system. There is no clear-cut reason why that should not happen, but the benefits to justify the transition would have to be substantial and very explicit.

In summary it is not easy to see how an external valuation system, an international asset reserve system and a settlement and accounting system would be regarded as adding a great deal of value to the existing ETS. In particular, sufficient added value to make the political issues associated with internationalizing some of the functions and tools worthwhile (especially for a subnational jurisdiction where political attention is currently focused more on making the ETS compatible with new Federal power-plant regulation). CMC systems and services could offer a way of easing some of the technical difficulties associated with a linkage, if the political and economic motivation for that linkage was high enough.

Japan's BOCM

Japan's Bilateral Offset Crediting Mechanism (BOCM) displays some features of a carbon trading club, albeit one in which the reduction units only flow one way (in return for other benefits which flow the other). In pursuit of regional political and economic ties, often involving specific capital investments, Japan has created a clutch of agreements with countries who provide back to Japanese investors (and the Japanese Government) emissions reduction credits from projects following specific BOCM project protocols. The accounting treatment and utility of this mechanism at the UNFCCC level, or within any other international emissions reduction accounting system, need not detain us here; the interesting question for present purposes is the decision making on the additionally and reliability of the emissions reductions transferred (often earlier in the project lifetime than would be the case under comparable CDM protocols). These assessments are very much Japanese, ultimately Japanese Government, ones. While the system started at least partly in frustration with the slow pace of decision making and contested decisions by the CDM Executive Board, it seems quite possible that the political comfort and benefits of operating by made-in-Japan rules might outweigh the attractions of a more user-friendly and reliable independent international assessment system.

As with all linking decisions, the offset quality and acceptability issue casts a long shadow, partly due to the widespread historic political discontent with some CDM project types. An NCM mitigation value assessment of putative Japanese units would have to cope with the degree to which a sui-generis offset system affected the value of the whole. This is not a problem limited to Japan, but the importance, size and history of the BOCM make it particularly important here.

Australia/New Zealand

Australia and New Zealand offer a history of approaches to emissions trading full of interesting perspectives on linking and internationalizing, even if up till now on the

Australian side it is a history of might-have-beens. Most importantly, these are countries where the need for access to international markets in emissions reductions has been more appreciated and less overlain by quasi-moral or other concerns than elsewhere. Even so, the discussions between the two countries about linking in the Rudd-Clark days, and the later Australian discussions with the EU over connections and a pathway to linking with the EU ETS, show the persistence of difficulties over national compromises on design issues.

It seems, based on the evidence of the willingness to use offsets, that a solid system for the estimation of mitigation value could be of use if Australia were to reach out to partners again (though if some of those partners had doubts about that system and feared linking might import some contamination, that could slow things down.) As for an international reserve and settlement systems, the Australian design effort on trading over some 20 years has produced a number of bespoke and apparently efficient approaches to cost containment, most recently transitional price floors and ceilings in the now-aborted Carbon Pricing Mechanism. Conceivably, a new approach to the politically-vexed issue of pricing might benefit from an argument that emphasized internationalized design features to distinguish it from past rejected domestic ones, but the politics might, at the relevant time, go a different way.

Pro-Trading Coalitions of Governments and Others

The resurgence of interest in emissions trading has led to a number of statements and declarations by countries, subnational jurisdictions and companies in favor of carbon pricing on a global scale. This trend can be dated from the UN Secretary General's Climate Summit in September 2014 (73 national governments, 11 regional governments and over 1000 companies and other organizations signaled support for pricing carbon). Not all appear to support markets as the best way to establish and adjust the carbon price.

Perhaps the four most important groupings involving governments are the Carbon Pricing Leadership Coalition established at the summit and now largely driven by the World Bank; the G7 Carbon Market Platform established under the German Presidency, now open to non-G7 countries as well; the 18 nations led by New Zealand who endorsed a statement in favor of carbon markets at

Figure 3: Schematic of Networking between Different Carbon Markets

A: NCM in Principle Allows Transactions in a Common Currency between Climate Clubs

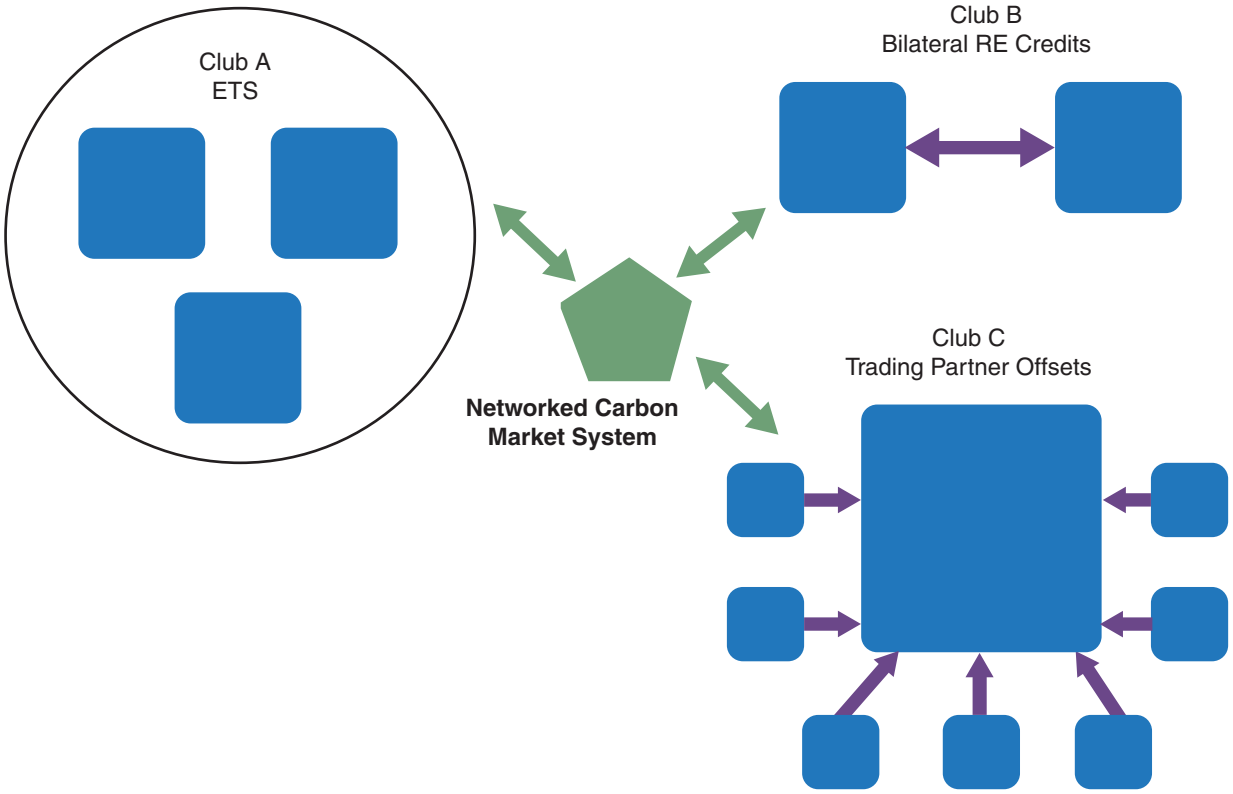
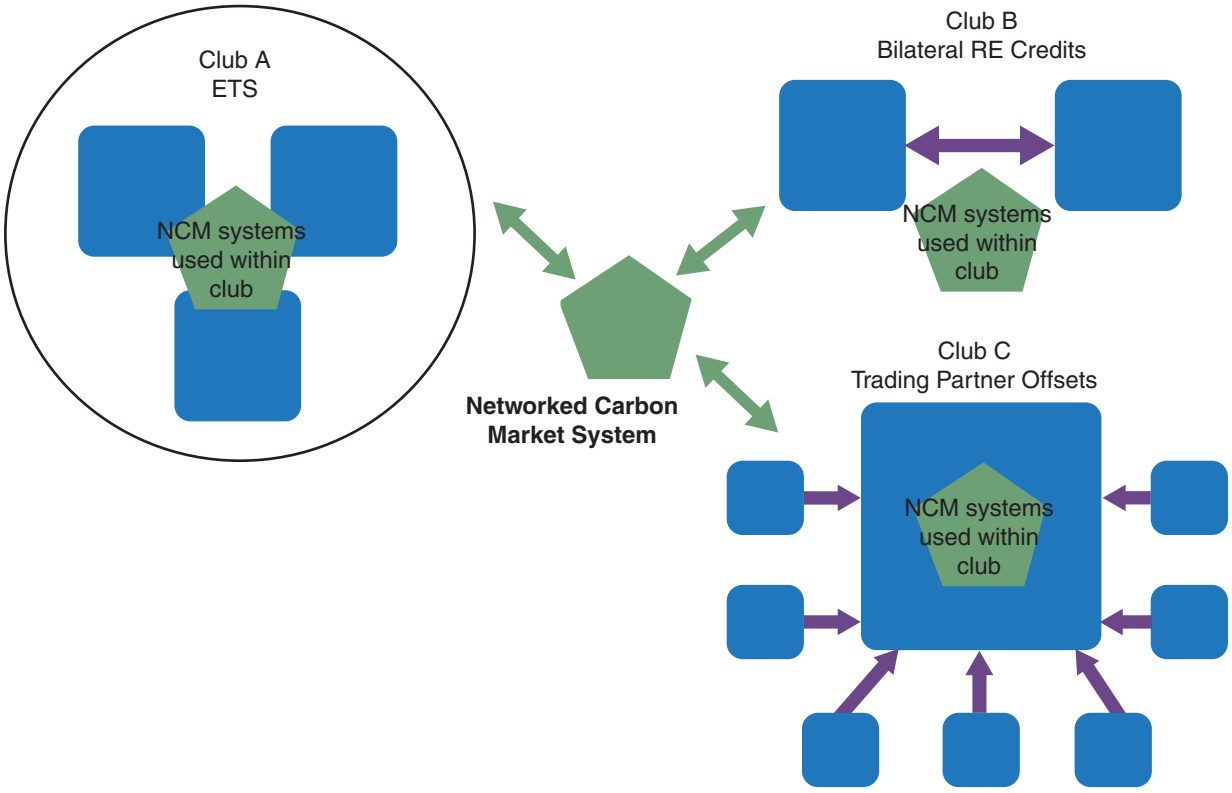
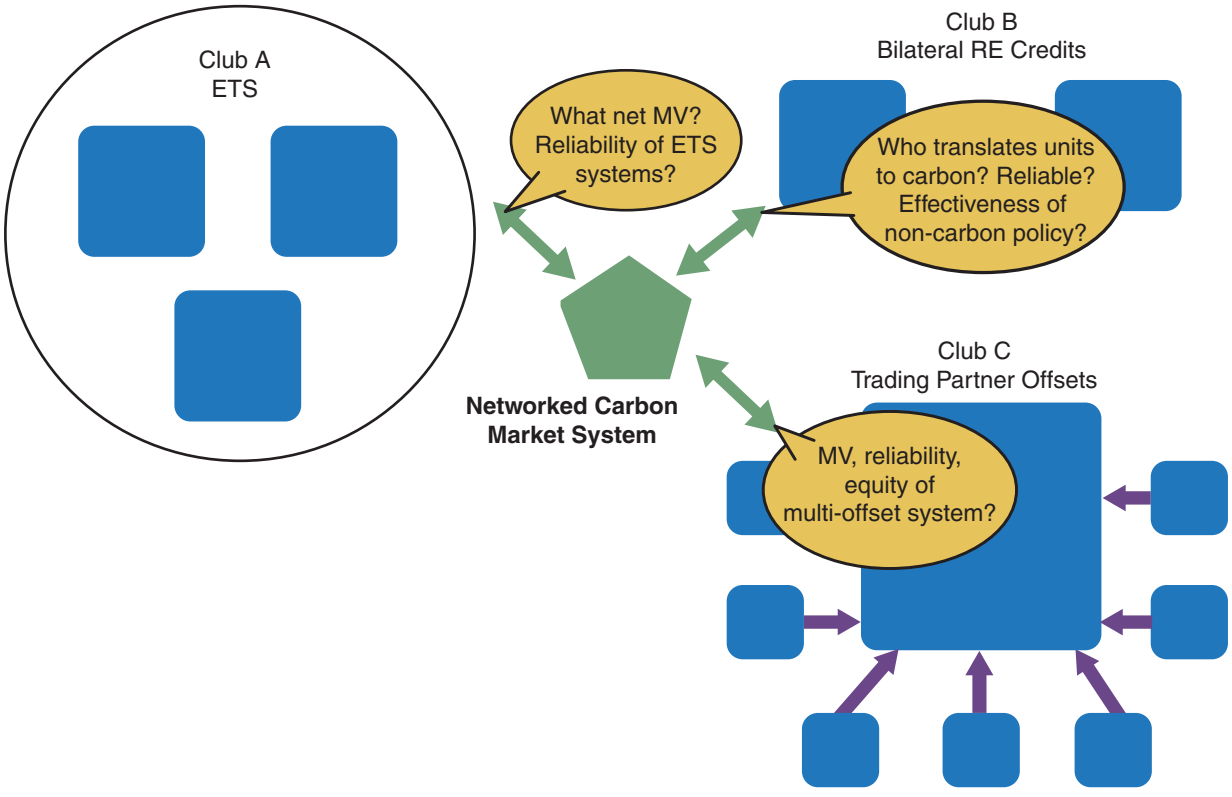


Figure 3: Continued

B. NCM Also Offers Benefits for the Operation of Clubs Where Internal Value Assessments, as Well as Scalable Reserve and Settlement Mechanisms, Are Needed



C. In General, the Value Assessment Task May Be Harder Where Clubs Operate in Different Units or through More Complex Mechanisms



the conclusion of the Paris COP in December 2015; and the 30 Implementing and Contributing Participants in the World Bank's Partnership for Market Readiness (PMR), which pre-dated the UNSG Summit by starting in 2011. However these are coalitions, not clubs: broadly there are no particular rules by which members or endorsers must abide, nor tangible benefits accruing beyond exchanges of information and mutual support. It may sound reasonable to expect such groups of supporters of wider pricing and markets to want to trade with each other, but the gap between support and action is in practice large.

3.4.2. Other Types of Climate Clubs

Clubs with Different Motivations

Looking back at the purposes and objectives of club-types (3.1 on page 12) other than existing carbon or other pollution reduction schemes, it has to be acknowledged that there are not many that translate easily into unitized commitments.

On the basis of the full range of climate club objectives, we might be looking for numbers of technologies transferred, numbers of standards shared, dollar amounts of capital investment commenced or concluded, percentage increases in specific types of trade, numbers of demonstration projects started. The distance between these sorts of club success measures and the CMC systems and services proposed above is substantial.

In principle efforts could be made to turn each of the unit-candidates here into, or make sure they were accompanied by, estimates of consequential carbon reduction, and one could in theory envisage an assessment system universally accepted as making the best efforts to determine, say, what the (medium-term?) carbon consequences of a successful CCS pilot in country x might be.

But even so, it has to be considered whether there would be political will on the part of the members of (say) a regional trade agreement, who may well be in different political camps when it comes to international climate change politics, to agree that a carbon-translation protocol should be added to their agreement and then used to judge its success. This depends, however, on the motivations and the power-balance between the members of the climate club. A technology transfer/export club can be envisaged where one large economy wishes to take credit for all or some of the actual or expected carbon reductions resulting from the offshore use of their technology, in comparison with some higher-carbon counter-factual. This is broadly the model being followed in Japan at present. It is the arrangement characterized as Club C in Figure 3 on pages 17–18, which considers how such a Club might be networked with other Clubs using different approaches to trading, and outlines some of the challenges in designing rules for the networking.

Clubs with Different Units

Even for clubs whose purpose and objectives is more easily quantifiable, the bigger question is the precise club objective and the way that a market approach might serve it, which leads into issues of the units in which a market might be created. We are familiar with tonnes of carbon emitted per annum, or units that can be resolved into these tonnes by a simple equation. But clubs focused more on specific pollutants like methane or black carbon, transport miles, fuel types, energy efficiency, or air quality might tend to think more in terms of other units or may involve areas where carbon translation protocols are not universally agreed; and while there may be analogous design and structure issues it is not going to be easy to fit markets in other units without clear and agreed carbon consequences within broader systems for calculating carbon/mitigation value, a networked reserve scheme or even a common MRV system. It is possible to imagine a system of exchange rates whereby, say, NO_2 or methane reduction commitments could be translated into changes in carbon (here as with other pollutant reduction efforts the sign of the carbon change is not always negative), but the decisions along the way about how the pollutant reduction policies and programs would impact in a particular country would be extremely challenging and unlikely to find political agreement. The task should be easier for renewable energy and energy efficiency policies, where national trading schemes have already been designed and put into effect (in particular the Indian Government's Renewable Energy Certificate (REC) and Perform, Achieve and Trade (PAT) schemes). The carbon saved or expected to be saved is at one level comparatively easy to calculate, but if the savings are translated into units tradable within the club, there will have to be club agreement on methodologies and perhaps safeguards. If the club operates only in its own non-carbon units (e.g., energy consumption units), the only translation issues are those addressed in national Government assessments of the carbon consequences in order to inform the national inventory and climate plans. But if the club aspires to trade with, or be linked or networked with other clubs in a carbon-denominated meta-club or network, everyone in the network will have an interest in the translation from the club's units into carbon. The translation protocol could end up taking over some part of the national delivery risk of carbon

consequences of energy policy, which is probably best managed by national governments.

The model of a trading scheme built on exchange of non-carbon units, which are then translated into carbon for the purpose of wider linking or networking with schemes operating a carbon currency, is represented as Club B in Figure 3 on pages 17–18.

If, however, there is a club that comes to a decision that it accepts that carbon-denominated trading is in line with club objectives, then the scheme design issues that arise are those familiar to emissions trading experts the world over: who are the compliance entities, cap-and-trade or baseline-and-credit, banking and borrowing, settlement and enforcement procedures, etc. In those circumstances CMC systems and services should be neither more nor less attractive to a club as to an individual ETS contemplating linkage or offsets.

Club Governance

As for the governance of the club, apart from high-level factors such as the efficiency and ease-in-use of club rules (e.g., majority voting, frequency of decision-making opportunities, separation of technical from political decision issues), there seems no particular reason why one governance structure for a club should be better than another when it comes to the design or use of markets. In principle, perhaps a club with no means of collecting member fees or other financial mechanisms to provide infrastructure would be more likely to use services and systems offered by an externally-financed CMC, but even this may present some political twists. Again in principle, the use of CMC systems and services should be more attractive to clubs without a high domestic political component in their decision making, or to administrators who do not want to subject technical decisions to political or amateur debate and have enough influence to steer the club's decision makers towards standardized systems. However there have been instances of comparatively technical issues in emissions trading developing political momentum because of pressure from industry or NGOs. And political baggage can quickly be developed around organizations intended to be neutral or independent.

Clubs of Cities, Companies or Sectors

One of the most significant developments in climate change politics in recent years has been the emergence of non-State actors. International groups of City and Regional Governments have emerged who have been prepared to exceed their national Governments in the ambition of their commitments to emissions reduction and other activities, and who have sufficient legal or policy levers to achieve measurable progress. Business organizations—sectoral, national or more widely-based—have also come together in support of climate actions, increasingly focusing on carbon pricing. As the importance of these initiatives for the overall implementation of global climate policy has become clearer, they have been brought together within the UNFCCC under the Lima-Paris Action Agenda and the Non-State Actor Zone for Climate Action, whose work is intended to be strengthened by the COP21 Paris Decisions.

Mostly, these are coalitions rather than clubs, following the distinction made above in respect of groups of pro-trading governments. The exception is the class of regional emissions trading schemes. To the examples of WCI and RGGI, mentioned above, can be added the Japanese cities of Tokyo, Saitama and Kyoto, and some indications of movement towards a collaborative approach to trading at subnational level in Canada, Australia and Brazil at various times. The provincial trading schemes in China which are driven by national policy, even if involving some voluntary inter-province connections, and the enthusiasm of subnational entities in some developing countries to supply offsets to trading systems elsewhere, probably fall outside this group.

Could the availability of CMC systems and services push more subnationals towards formal trading links with each other? The answer must in principle be yes, but again the barriers are largely political rather than technical, so easier technical solutions can only achieve so much.

Coalitions of non-Governmental organizations seem much less likely to move to formal trading outside a regulatory system. In principle, companies who have declared an objective of reducing emissions, from installations or supply-chains, and who publish their internal price of carbon, ought to be amenable to "swap" arrangements or others under which they demonstrate the achievement of their objective by buying (at the appropriate value) as well as making emissions reductions. But as with Governments, many stakeholders will feel something vital has been missed if the reductions are outsourced or bought-in. The benefits of CMC services are not likely to weigh much in that balance.

The Example of the International Civil Aviation Organization (ICAO)

ICAO offers perhaps the most interesting and by far the most advanced example of a club, embracing climate objectives but not set up to trade, moving to do so. ICAO's work on market-based measures, leading up to a

reconsideration at the 2016 ICAO General Assembly, has tended to take place in camera, and external assessments of where the work is likely to end up are necessarily speculative. It seems most probable that large-scale purchase of offsets will play a significant part in the leading MBM options put forward to the Assembly, and proponents of the merits of different offset certification schemes have been active in the aviation industry and at ICAO.

If there were available, as a result of the actions of a CMC or otherwise, a carbon translation protocol or mitigation value system which offered the possibility of a wider scope of units of emission reduction with internationally-agreed valuations, this could in principle be attractive to ICAO and its members. However once again there are political considerations. Many of the developing country members of ICAO (setting aside their concerns over increases in transport costs and their interest in introducing an element of "common but differentiated responsibilities" into a hitherto undifferentiated club) are currently suspicious of trading in international climate policy outside the established confines of the CDM.

With no history of or investment in price and risk control systems, a developing ICAO system ought to find the benefits of a reserve or insurance scheme, standardized market facilities and internationalized settlement systems appealing. But handing over elements of an ICAO system to a non-UNFCCC body might generate much internal debate.

A different problem is ICAO's current timetable. Under current plans, recommendations on the eligibility criteria for offsets and on registries are due to go to ICAO's environment committee CAEP in February 2016, so that a full proposal can be put to the October 2016 ICAO Assembly. If the MBM is to be ready in 2020, and reporting obligations are to begin as planned in 2018, there is no time for further slippage in the Assembly decision. While the overarching goal adopted by the 2010 Assembly of holding net aviation emissions to their 2020 level is an aspirational one, and could be interpreted as not being incompatible with starting the MBM later than 2020, at present ICAO is unlikely to want to wait to see how NCM services develop before finalizing their scheme design.

Also, the CMC approach of carbon or mitigation value as applied to units of state mitigation outcomes is a rather different approach to the reliance on traditional CDM and VER offsets that ICAO is close to adopting. It can be argued that the Paris outcome (see below) makes this a declining market, and ICAO would have to come back to this issue; so the best approach with ICAO may be to try to establish review points in the development of their system at which new developments with CMCs and the UNFCCC mechanisms can be considered.

Section 2.3 considered the International Maritime Organization (IMO) alongside ICAO, and there have been times, since the Kyoto Protocol required Parties to work through these organizations, when progress towards a market-based measure seemed to be roughly equivalent in both. However there are particular complications in the structure of the maritime industry, and at least as much political concern over incorporating UNFCCC principles and objectives. At present it seems likely that it would take a successful move to MBM in ICAO to give renewed impetus to the IMO debate.

Pacific Small Island Developing States and the Pacific Islands Development Forum

Finally it is worth looking in more detail at an example of a recently-formed climate club of nations. The PSIDS and PIDF were described in Section 2. Its 14 members have come together to make aggressive carbon reduction and green growth commitments. In the Pacific Environment and Climate Exchange (PECX), there exists a regional hub for, among other things, identifying projects and assisting with private sector finance including by means of verifiable carbon credits. Recent statements made by PSIDS members indicate an openness to markets including REDD+.

There is no documented direct answer to the question "would PIDF form a platform for a regional emissions trading scheme?" In principle it could, but it seems likely that the attention of the member States, when it comes to carbon markets, will be focused more on carbon finance for domestic projects on CDM lines, and on ensuring that ICAO and IMO do not come up with emissions reduction systems that cause economic damage to island states, than on transfers of mitigation outcomes (MOs) between PIDF members. The prospect of a new UNFCCC mechanism for international transfers building on CDM and JI, in the light of the Paris Agreement (see below), may make PIDF members inclined to examine the benefits of a new global system rather than create a new regional one, though this may depend on how the new mechanism turns out, and how long it takes to implement.

A strongly-CDM/son-of-CDM-focused club could be expected to be interested in NCM systems and services to the extent that they ease the way to providing carbon finance in return for transfers of mitigation outcomes. If,

in the absence of or to supplement a new international mechanism, one or more of the PIDF members saw an opportunity to establish a link with a predominantly purchasing group—say, the EU ETS—that had become interested in buying South Pacific MOs, it seems likely that the PECX could perform a beneficial clearing house role, and the availability of common and well-understood global rating, insurance and platform services via CMC services could be attractive. Papua New Guinea, but no other PSIDS member, was a signatory of the New Zealand-led statement on markets referred to in 3.4.1. But there would be many steps on the road to PIDF becoming a trading club looking to link with other clubs.

3.4.3. Summary—Challenges for Clubs

Against the background of the ICAO and PSIDS/PIDF cases, it is worth pausing to consider which aspects of the CMC systems and services might provide clubs with challenges. It is hard to see why these difficulties would hit club use of the CMC harder than individual jurisdictions or one-on-one linking decisions, other than through the probably more challenging processes of securing full club agreement, and the possibility of concerns arising that the main club objectives were being adversely affected or undervalued in some way. However the difficult points are probably:

- the judgements made about the equity or appropriateness of targets, and the likelihood of their delivery, in the MV assessment;
- the potential for confusion about what emissions reductions are actually being achieved in a jurisdiction that makes significant use of international reserves;
- and the possibility of relinquishing control of market settlement and accounting systems that appear on the basis of experience in the EU ETS and elsewhere to need close attention to avoid politically embarrassing slip-ups.

3.4.4. CMC Systems and Services from the Perspective of Market Players

So far we have been looking at the potential attractions of CMC systems and services mainly from the viewpoint of jurisdictions, groups of jurisdictions, or sectoral authorities. The views and preferences of actual and prospective market players, whether compliance entities, intermediaries or market-makers, may in the past only have had a limited role in when major ETS design decisions were on the table. But the economic impact of any CMC, like any ETS, will in part depend on how far its systems and services gain the confidence of market players, and allow the wider markets to function with the economic efficiency of which they are capable.

Mood and perception are important for banks and investors. The withdrawal of many players from the EU ETS and CDM markets over the past few years was influenced by the perception that the EU had no answer to its problems of over-supply, that the international negotiations were stuck and would not push countries to adopt more aggressive mitigation targets, and that demand for the CDM had dried up, for the long term. The mood has changed to some degree. Even before Paris, more positive statements from Governments, international organizations and business leaders, the widening pool of domestic emissions trading systems, and the spread of various forms of carbon pricing in companies as well as Governments were giving the impression that carbon trading might stage a comeback. (The impact of the Paris Agreement is considered below.)

But once bitten, twice shy. Many financial players would want greater reassurance this time that involvement in carbon markets does not involve excessive risks, represents a real business opportunity and is consistent with core business models. And there have been some structural changes: many banks have decided to exit the commodities markets altogether.

Due diligence for playing in a new carbon market is going to involve more careful assessment of the regulatory, IT and accounting environments, the means of valuing positions particularly through adequate data for the process of marking-to-market, the availability of liquidity, plausible counter-parties, and hedging strategies. Risk categories now recognized as requiring separate analysis before confidence can re-emerge include policy, regulatory, reputational, operational, non-delivery, tax and legal.

The good news is that the use of pre-existing CMC services could reduce many of these risks, or at least make them easier to assess from the outset. If registry arrangements, market supervision, market participation, entry conditions, allowable derivative instruments, accounting conventions, and provision of market data were all to become standardized across the globe, some significant sources of friction on private sector participation would be reduced. (Compare the market's long-term push towards using English law for carbon market transactions). Trust, always an essential for markets, would increase. And the availability of a well-funded liquidity provider or market maker could also provide comfort, depending on the clarity of the rules of their engagement. A CMC, or a good set of available CMC systems and services, should act as

a driver for increasing scale, liquidity and price stability in existing ETSs, and should improve the probability that new ETSs are attractive to the markets on these criteria.

However, the most important issue is the extent of the economic opportunities in the market. And the way potential market players will react to transactions that cross the border between one ETS and another will depend vitally on the precise way the compliance regimes in each ETS deal with imports, and what additional opportunities this gives to compliance entities to reduce the cost of compliance, to equalize risks where they have compliance obligations on both sides of the border, or to hedge or swap risks of adverse price movements over time.

Differences in market conditions one side or the other of a linking border, such as more liquidity, different tax arrangements or differing perceptions of risk, could also generate cross-border transactions. The availability of CMC "technical" services in the areas of insurance or data, for example, could smooth some of these differentials, or reduce the possibility of high-impact risks.

How does this analysis differ as between climate clubs using CMC services and those adopting the rules of an individual ETS? Hardly at all, provided the rules are clear and the services well designed. A clear set of rules about how imported units would be valued and dealt with, and the availability of institutions that had internalized the cost and uncertainty that otherwise exist for transactions crossing borders, seems likely to make inter-club transactions much more viable in principle than they would be without these services. But as always the first and most important issue is whether sufficient demand exists, and can be relied upon.

3.4.5. Monitoring, Reviewing, Verifying (MRV)

Broadly, any form of club that contemplates the sale or exchange of emissions reductions between its members should benefit from the use of trusted and well-designed off-the-shelf MRV, registry, settlement and reserve systems.[19] And to the extent that these markets use familiar and trusted systems and structures, the risks to market participants (compliance entities of whatever type, agents and market-makers) will be lower, their propensity to engage will be higher (leading to better liquidity), the mark-up on transactions will be correspondingly less, and the value of reduction units will be more bankable.

The issue is how much the benefits associated with using readily available and trusted systems will affect the larger decisions about going ahead with a market where previously there was only a club.

3.5. The Four Questions

Returning to the four questions posed above about comparative advantage of CMC systems and services to clubs as opposed to single jurisdictions:

1. Clubs more likely to find CMC systems and services attractive than homegrown ones

There can be no hard and fast rule here, but given the possibility of competition or lack of total trust between club members, and the comparative unlikelihood that one club member would have indisputable market-leader systems with which the others were totally happy to fall in, using a reliable third-party system does seem likely to have more advantage.

2. Types of club that would only proceed to the creation of an ETS on condition of CMC services and systems being available

This is a pretty theoretical question, given the successive filters marking progress from a club to an ETS, but at the margin the answer must be that the political and cost advantages could make a difference to an otherwise evenly balanced go/no-go decision for the club.

3. CMC easing the passage to agreement between club members on ETS design and linkage

This seems slightly easier to answer: once club members were engaged in a positive debate about creating or expanding an ETS, the availability of off-the-shelf solutions to some tricky but unavoidable technical and structural design problems seems likely to be beneficial, even if it only concentrates minds on the creation of a better bespoke system.

4. Impact on potential formation of climate clubs

This is perhaps the most important question.

Firstly, we have to accept that carbon markets, or any markets, are far from central to the motivations and benefits of most of the club types that we have considered.

In simple economic terms, the use of CMC services ought to reduce or subsidize the transaction costs of creating

[19] For a detail on the registry requirements and governance arrangements needed to support clubs see, 'The Regulatory Framework to Support Carbon Market Linkage' (Reed Smith, April 2016) http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/4/680061461687518813/The-Regulatory-Framework-to-support-the-NCM-Linking-Model.pdf

infrastructure and systems and allow, at the margin, more clubs to be formed, or clubs to be more attractive to more potential members. There are obvious economic benefits from wider access to markets: the CMC ought to allow these to be achieved at lower cost.

However, simple economics is only a small part of the story. There are a number of political challenges that have to be met:

1. Is it regarded, within the ethos of the club members, as politically and morally acceptable to use someone else's emissions reductions rather than concentrate on improving the situation at home?
2. Is it regarded as acceptable to send money abroad, even if to other club members, in pursuit of these objectives?
3. Are the other members of the club trusted politically, even if there are systems in place to give technical reassurance about ambition and environmental integrity?
4. Is it possible to make the club benefits of trading exclusive, particularly in WTO terms?
5. How easy would it be in practice to get agreement on quantified comparability of ambition?
6. To what extent is the uncertainty about exactly how to use purchased emissions reductions in fulfilment of INDC pledges going to rob market formation of any bankable economic benefit in the eyes of national Governments or even other types of club members?

The politics around these issues are clearly very different in different parts of the world (as can be seen from the history of approaches to carbon trading in Japan, Quebec, British Columbia, Australia, etc.), but for each of the questions there are clearly major inhibitions that could get in the way of forming climate clubs which involve markets making use of CMC structures. Against the background of these issues, the comparatively small differences in costs and ease of design and use that could be achieved by using CMC systems and services is unlikely to make a great deal of difference. As noted above, the EU is a form of climate club, and the process of creation of the infrastructure of its emissions trading scheme, at a time when international systems were being created by the UNFCCC for the implementation of the Kyoto mechanisms, could offer some lessons.

The desire to keep control of structures and institutions in the EU (and preferably Brussels) was very strong. Moreover, during the initial phase of the EU ETS the individual Member States fought to keep scheme elements such as registries, platforms and auctions at an MS level, despite the obvious potential economies of scale, conceding a more harmonized system for the second phase somewhat reluctantly and in the light of clear demonstrations of difficulties with some individual MS systems.

3.5.1. CMCs and Individual ETS Linking

What are the differences between the arguments for and against linking markets, and for making use of CMC structures—apart from the reduction of transaction/administration costs and possibly some reputational benefit? We are still at an early stage when it comes to linking trading systems. The progress of linkage in practice seems likely to be at least to some degree dependent on the success of California/Quebec/Ontario, and to a lesser extent Switzerland/EU. We do not yet know enough about the process of moving from provincial to a national scheme in China to be clear whether any lessons can be learned for voluntary linking as opposed to national choices. It could be argued that approaches to individual-jurisdiction linking so far have left something to be desired when it comes to the maximization of efficiency and liquidity. However, each decision, or draft decision, has represented the maximum that one partner or the other felt safe with.

It seems reasonable to assume that this caution, and the fear of unintended consequences from losing some degree of control of units flowing into and out of the ETS, will be reflected in a process of linking with training-wheels and safety-nets: quotas, floors, ceilings, fixed discounts are a particular focus at present of administrators with responsibilities for ETSs across the world. (This is the "restricted linking" referred to at 3.2 above.) It would be surprising if a putative group of climate club administrators considering extending to trading, or a new trading club, would be bolder. It may take some time before the CMC solutions develop enough to make better decisions easier to take; though once the systems and structures are there and being used successfully, wider usage could take off rapidly. It is probable that clubs will move with greater caution than individual jurisdictions, but this can only be a theoretical judgement, taken at a time when the set of climate clubs considering introducing trading is an empty one: in reality one bold club might in fact make all the difference.

3.5.2. The Impact of the Paris Agreement

Since the first draft of this report was completed, UNFCCC COP21 has produced a new international climate agreement. The general verdict is that the document is

more substantial than was expected, and restores some faith in the UNFCCC process. From the perspective of CMCs and climate clubs, a number of features are worth emphasizing (also see Macinante [2015] and Marcu [2015]):

- To the extent that climate clubs are motivated by concern that the international process for achieving emissions reductions is not up to the job, Paris will reduce that motivation.
- However, even though extensive but nuanced recognitions of differentiation are still in place, there is no specific reference in the Paris Agreement texts to the Annex I/non-Annex I division—this could open more doors for collaborations across jurisdictions.
- Specifically Article 6 of the Paris Agreement encourages voluntary cooperation between Parties, arguably to a greater extent than previous key UNFCCC texts, and Article 6.2 envisages transfers of "mitigation outcomes" from any one Party to another (the so-called Internationally Transferred Mitigation Outcomes, or ITMOs). So joint emissions-reduction clubs of Parties ought in principle to be welcomed.
- Yet the means by which Parties make and account for such transfers are apparently expected to be controlled by UNFCCC processes, which may or may not be consistent with or leave room for the CMC systems and services. The new "mitigation and sustainable development" mechanism (Art. 6.4) offers one reasonably worked-up route for the international transfer of mitigation outcomes, and clearly envisages the participation of private sector entities; though the apparent requirement for additional emissions reductions (Art. 6.4d, Dec. 38d) may pose complications for market-based trading systems and computations of carbon or mitigation value. The extent to which this mechanism is intended to cover all the transfers envisaged in Art. 6.2, and the likely difference in rules and methodologies if there are in fact two routes rather than one, is not yet clear.
- While the role of carbon pricing is recognized as important (Dec. 137), the Agreement creates conditions for markets and market mechanisms to function/develop but provides little direct support in that regard. In fact the word "market" is entirely absent, except in the phrase "non-market."
- The model of groups of Parties, or other actors such as cities or companies, creating an intra- or inter-group trading environment, with some third-party translation and exchange-rate service, also poses uncertainties about interpretations of some specifics of the Paris Agreement and applications of them to particular cases (though joint action by Parties forming Regional Economic Integration Organizations continues to be recognized). However, provided the outcomes of the trading can be expressed in terms of specific Party-to-Party transfers of tonnes as recognized by the UNFCCC on the occasion of some accounting true-up, it seems possible for the model to be made to work.
- But many aspects of the model may be affected by the regulatory system which will now be put in place by the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the CMA (Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement); note in particular the recommendations that the CMA adopts rules on the scope of activities permissible under the mechanism, that verification and certification of emissions reductions be undertaken by Designated National Entities, and that adopting the rules of the mechanism should be on the basis of experience of the existing Kyoto mechanisms (Dec. 38). SBSTA's work will probably be the subject of considerable lobbying.
- There is an open question whether Article 6.2 meets the needs of those Parties who may have been considering bottom-up international trading out of frustration with the experience of UNFCCC-regulated mechanisms, or for subnational or other non-Party entities who were attracted by trading but saw no scope for recognition of their activities in a world of Party-based accounting. It seems only logical that transfers of mitigation outcomes under Art. 6.2, however heterogenous and unconstrained by CDM-type rules, will have to be translated at some point into carbon reduction numbers that are internationally agreed on and which can be brought to account in assessments of the delivery of Nationally Determined Contributions. The degree of control over, and flexibility for, these assessments will be important in determining the use made of this provision.
- Finally but most importantly, markets only exist to satisfy demand. While the INDCs indicated a significant number of Parties were interested in market-based systems as domestic mitigation policy tools, the number of advertised potential buyers of internationally transferred mitigation units is extremely low. It is still arguable that the whole bottom-up basis of the Paris Agreement will make it less likely

than under the Kyoto system that Parties will make commitments which can only be cost-effectively met by buying emissions reductions abroad, or allowing their purchase, as well as delivering them at home. It remains to be seen whether Article 6.2 and the new Article 6.4 mechanism can command such confidence that the previous drift away from the CDM and JI (which 6.4 seems to resemble but which has suffered at least as much criticism over inefficient procedures and lack of environmental integrity as the CDM) can be reversed.

In the run-up to, and in the margins of, the Paris COP, a significant number of announcements were made favoring carbon prices or adding members or signatories to the coalitions referred to above, and after the COP South Korea and China announced their intention to cooperate on technical matters relating to emissions trading. The EU has made it clear that an increase in their INDC levels of ambition, previously identified as the only circumstances in which they would consider making use of international mechanisms, is unlikely, though the Commission has indicated that there may be a role of the new Art. 6.4 mechanism in meeting non-ETS sector targets.

3.5.3. Using CMC Services after Paris

If the Article 6 rules do leave space for CMC systems and services to work broadly as originally envisaged, either for Article 6.4 mechanism transfers or for broader Article 6.2 cooperation, further work will be necessary to identify the types and circumstances of transfers and cooperation that CMC is expected to facilitate. We have noted above that many filters need to be applied to present-day climate clubs to identify those likely to embrace trading of emissions reductions. But assuming that, perhaps owing to the additional stimulus of Paris, there are clubs poised to transfer or trade, it is important to consider who the members would be, which entities would be transferring or trading, and what economic and political incentives and objectives they would be following. As a first step towards this analysis we have identified some plausible classes of "club propositions"—mutually beneficial activities and arrangements between club members that involve transfers or trading. So club members could say to each other:

- As governments we will purchase from each other, and incorporate in our reports on NDC performance, units of emissions reduction from other club members (provided they do not attempt to score them in their own NDCs) in pursuit of net economic efficiency in the club's mitigation efforts—i.e., in recognition that club members' MACCs differ. The price would reflect the normal rules of demand and supply. (This could also apply to provinces, cities, industry associations and other NAZCAs, operating with the permission of the governments that must do the final NDC accounting.)
- As 1, but we agree in advance a fixed price list to operate between us, which could reflect some common or externally-provided assumptions of carbon value, or mitigation value.
- We will allow our individual compliance entities in our emissions trading or pricing systems to purchase units of emissions reduction from entities in other club members' systems to offset their compliance obligations, with net transfers accounted for in national NDC reporting. Pricing could be purely market, or reflective of fixed exchange rates.
- As governments (or NAZCA entities) we will do technology, IPR, aid or other climate-related deals with each other where some or all of the consideration or conditionality is in the form of units of emissions reduction. CMC-derived "carbon or mitigation values" or other rating systems could act as a guide in negotiations. The transfers would be reported in accordance with NDC accounting rules.
- As 4, but the deals are done between NAZCAs, with the approval of governments.

Any or all of the inter-government and—provided the government-to-government consequences are clearly worked out—inter-NAZCA entity transfers here could be channeled through whatever comes out of Art. 6.2 or 6.4 (or indeed Art. 5, on forests). The degree to which the elements of CMC services could be useful to the participants will differ depending on the "club propositions." To maximize use of CMC services, the benefits of using each element in different situations should be specified and marketed.

If the post-Paris clubs are willing to take the step of trading between each other, as well as trading within the club, all the issues about deciding to link trading schemes and the benefits of CMC systems and services to assist linking, which are set out in 3.4 on page 14, will apply.

Much remains to be decided or clarified about the operation of the broader form of cooperation provided for in Article 6.2. There is no automatic requirement for the results of the cooperation to be defined in terms of tonnes of carbon, which may provide an incentive for forms of cooperation that are politically or otherwise easier if initially defined in different metrics—for example renewable energy or energy efficiency credits. This has

been seen as one of the advantages of a Paris Agreement "transferable mitigation outcome" system as compared with the Kyoto mechanisms, and it could give a boost to the formation of climate clubs and to clubs moving to adopt internal or external trading. However, if political or economic drivers for these developments depend on there being some form of national-level credit within the international climate system, it is hard to avoid concluding there must be an internationally agreed system for calculating the carbon consequences of the transfers.

4. Conclusions

Our conclusions are divided into three parts: broader introductory observations which go beyond our remit but which have impressed themselves on us as we have conducted this work; specific issues and options for CMC systems and services; and proposals for further research or analysis.

4.1. Broader Observations

The difficulties in the way of harvesting the obvious economic benefits of international trading in emissions reductions are more political than technical. While some sources of friction can be removed by making systems and services related to trading easier and less expensive to adopt and operate, it should not be expected that this will weigh much in the balance against deep-seated political concerns or suspicions.

The CMC systems and services suggested so far in the literature are interesting and potentially useful as a means of opening debates about the possibility of imports to national or regional systems. They could also be useful to the advancement of the Carbon Pricing Leadership Coalition, the World Bank's Partnership for Market Readiness, and the development and utilization of the new Article 6.4 mechanism, as well as for the promotion of linkages between ETSs and the stimulation of independent trading clubs.

All international carbon market developments are in vain unless there is more demand. The COP21 agreements can re-energize efforts to create new international mechanisms particularly where it is clear that existing national commitments will not meet the agreed global objective. The stage is now set for a serious debate about how additional ambition could be achieved by nation states—by acting abroad as well as at home.

4.2. Issues and Options for CMC Design, Negotiation, and Operation

The benefits of, and issues associated with, the use of CMC systems and services are broadly the same for clubs contemplating creating a market as for individual jurisdictions, pairs of jurisdictions, or existing ETSs considering expansion.

- Such differences as there are reside particularly in the decision making and governance processes of clubs. Although the relatively small size of clubs compared with large multilateral organizations may make agreement easier, in principle, in negotiations on club design and implementation issues, an explicit inclusion of criteria for participation and compliance can pose difficult issues that inhibit consensus-building. However, the availability of independent or third-party design or technical solutions could facilitate agreement in some cases.
- In view of the inherently multicomponent nature of mitigation units, the potential for political friction over the adoption of external valuations should not be underestimated.
- "Not invented here" is a common and powerful factor already seen operating in ETS design; it is capable of being overcome when external systems have proved their worth and not picked up negative connotations, but it takes time.
- The great majority of debate on these questions necessarily takes place at present in a vacuum: there are very few current examples of climate clubs, however enthusiastic, which are seriously contemplating a trading scheme, particularly one starting from scratch. The on-going discussions of a "market based mechanism" in ICAO offer perhaps the most propitious—but also certainly a challenging—opportunity to test the attractiveness of a CMC offer.
- However, to help market CMC systems and services for maximum future use by clubs stimulated by Paris to consider transfers and trading of units of emissions reduction, CMC development should pay close attention to the likely "club propositions." There are different approaches that clubs could take, depending on their coverage, composition and overall motivation; NCM needs to present itself as most appropriate for each situation.

4.3. Topics for Subsequent Research

The CMC agenda following the Paris COP will include issues about INDCs, such as their comparability, as well as more generally the kinds of policy spaces that are available for market-based initiatives. These will overlap with issues about how to combine any new institutional arrangements with the existing international institutional landscape. The coordination of functions among the UNFCCC and any new arrangements will surely be among the issues needing focused research.

The provisions of Article 6 of the Paris Agreement may be especially relevant to CMCs, in as much as those provisions "recognize that some Parties choose to pursue voluntary cooperation in the implementation of their [INDCs] to allow for higher ambition in their mitigation and adaptation actions." The institutional, legal and political consequences at international, national and transnational levels will require further analysis.

The possibility of the creation of a club of countries with a minimum per tonne carbon tax needs to be explored further. How likely is such a development? Among what countries? What would the "club propositions" be? With what consequences for CMCs?

How could/should analyses of CMC possibilities be expanded beyond the focus to date on transaction cost economics to include such possibilities as the establishment of a global social cost of carbon?

The political constraints—at all levels—on the development of CMCs need more in-depth analysis, in order to complement the strong technical and economic emphases to date. The analysis of political constraints should include actual and prospective business reactions to proposed CMC systems and services.

In addition, business reactions to specific issues, options and features should be assessed in order to inform the CMC institutional design process.

In sum, much more analysis could be undertaken about the features and potentials CMCs, as well as the broader contexts in which any tangible attempts at CMC development will be launched. It is probably correct to say that the potential market for CMC products will only appear once fairly detailed products are available for inspection and debate.

Annex A: Brief Discussion of Club Related Presentations from the Harvard-IETA-World Bank Workshop in May 2015

The present paper complements other materials prepared for the NCM initiative. Two presentations at a workshop in May 2015 sponsored by Harvard, IETA, and the World Bank (2015) explicitly addressed club issues. This annex, which is focused on those two presentations in the workshop report, is not intended to be a comprehensive comparison or analysis of overlaps with those presentations; rather it highlights some issues that need further consideration, as the CMC project progresses.

Presentation 7 includes paragraphs on key issues addressed in the present paper. As for the benefits of being in a club and criteria for membership: "A *carbon club* would be a group of jurisdictions working together on market infrastructure and standard rules that other countries would want to join, based on clear benefits of membership that are not otherwise available. These would include aggregate cost savings and liquidity, and also possibly mutual guarantees that other members would not impose border carbon adjustments. Club members could also benefit from the ability to share some of the burden of creating and maintaining trading (e.g., infrastructure, transaction tracking)."

These potential benefits are consistent with those noted in the present paper. Similarly, the following discussion concerning membership criteria is also consistent with the presentation in the present paper.

As for membership, a "club could establish clear criteria for membership, including that all members have a market based policy with a hard cap, as well as basic requirements for transparency, data sharing, and MRV. This idea is modeled on other institutions, notably the WTO, in which there are not binding treaties being imposed on others. Rather, countries join together and agree to certain standards and practices in exchange for the benefits (most importantly, in this case, most favored nation trading status)."

In terms of fitting carbon clubs into the existing landscape of international institutions, a specific potential role is noted for the UNFCCC, which "would perform certain functions, including preventing double counting of emissions reductions applicable toward INDCs."

A relevant issue might be whether the question should be posed as to whether the UNFCCC "would" or "could" or "should" perform certain functions. It might also be asked whether there would/could/should be other roles for the UNFCCC. The discussion in the present paper about the relationship between the EU ETS and UNFCCC includes a brief reference to such inter-organizational issues.

Presentation 8 poses a series of questions which are followed below with brief answers derived from the analysis of the present paper:

- *Would a club concept lead to a tiering of countries?*

Depending on the meaning of "tiering," it would, yes, in the sense that non-members by definition are excluded from the benefits of membership. However, non-participation is a voluntary act and in that sense a self-imposed status not to be in the club.

- *Might "[a club concept] lead to the development of multiple clubs with different standards?"*

Yes, it could, but it would not necessarily.

- *"Could members who are not completely ready to be observer members [nevertheless] get some benefits?"*

Although the core concept of a club defines its benefits to be excludable to non-participants, it is imaginable that some marginal benefits could nevertheless be made available to non-members, perhaps as part of a multi-phase accession process, in which there are preliminary indications of interest in gaining membership—with or without formal commitments about next steps.

- *"Could different tiers of clubs benefit from sharing some standard centralized infrastructure?"*

Yes, an NCM infrastructure could be devised to accommodate the varying needs of different types of clubs.

Below we have inserted references in square brackets to specific sections of the present paper where there is a discussion of the item noted in the workshop presentation. The referenced sections do not necessarily include detailed answers to the implicit questions in the items; in some instances, there is only a recognition that there is an issue corresponding to the item. There are discussions of several of the items in Keohane, Petsonk and Hanafi (2015b).

The following were proposed as a straw man draft for consideration for basic recommended club rules:

1. Commitment to comparable targets (which may be rated in some manner) [see Section 3.4.2 in the present paper]
2. Common definition of units (allowances, offsets, etc.) [see Section 3.4]
3. Accepted scope of coverage [see Section 2.4.2]
4. Similar emissions-verification checks [see Section 3.4.6]
5. Compliance assurance (perhaps with some band; penalty defined) [see Sections 2.2, 3.4.1, 3.4.3, 3.4.6]
6. Shared registry (or network of registries) [see Section 3.4.6]
7. Accepted market surveillance system [see Section 3.4.6]
8. Agreed distribution of functions [see Sections 2.4.2 and 3.5.2]

Annex B: ICAO as a Market for CMC Systems and Services

This annex explores whether and how the NCM systems and services could make a difference to the adoption, operation and perhaps spread of the aviation Global Market Based Mechanism (GMBM), its relevance, its rationale, and whether it is likely to be politically acceptable.

ICAO's Situation

ICAO has no experience with carbon markets, although some of the necessary building blocks of a GMBM overlap with existing ICAO functions. For example the collection and reporting of data by operators on fuel use, emissions and the use of alternative fuels is required already for ICAO's statistical database (with data being reported by operators and submitted to ICAO by governments). This experience with existing reporting methods, templates and guidance is an advantage for putting MRV procedures in place. But in respect of the other elements, notably emission reduction unit eligibility and registries, ICAO does not have governance structures in place, or expertise, and will need to create resources in house or use external services (including giving consideration to structures that may be in place already, for example, the UNFCCC's International Transaction Log). It is currently envisaged that many of the decisions on the operation of the GMBM will be taken by ICAO's Council.

The following sections consider how ICAO might benefit from some particular CMC systems and services including in particular: (a) an International Carbon Asset Reserve, which could be used by jurisdictions and entities to reduce the risk associated with trading transactions, and reduce the quantity of emissions reserves each scheme has to set aside, (b) an independent assessment framework to determine carbon or mitigation value, and (c) an international settlement system to track trades.

International Carbon Asset Reserve (ICAR)

Addressing risk is a key requirement for reaching agreement on the GMBM. While aviation's future demand for emission reduction units can be estimated, governments and airlines are worried about the lack of information regarding the structure of the carbon markets after 2020, the ability of the markets to supply all the competing sectors, the impact on supply of the Intended Nationally Determined Contributions (INDCs), and the cumulative effect of these issues on price in the long term. With the carbon markets in a period of change, illustrated by the cessation of the Clean Development Mechanism after 2023 to be replaced by the new Sustainable Development Mechanisms, there is political nervousness at the absence of any guarantees that may make governments reluctant to implement a GMBM. The Paris Agreement may bring some clarity on this and to what extent governments will need to rely on the carbon markets and/or their own emissions reductions to meet those commitments. Advice from GMTF, meanwhile, concluded that the market has demonstrated its capability to react to demand and produce sufficient supply in the past, and that there is every reason to assume it will continue to do so. An early decision on the units accepted for compliance, at least on a preliminary basis, would give a degree of certainty to investors and stimulate supply, helping the market to be ready to respond to international aviation demand, GMTF advised.

Concern about the cost of participation (and the long-term impact on aviation's development) appears to be a higher political priority within ICAO than securing environmental integrity. This has been reflected in EAG discussions that have touched upon the need for a price ceiling, and its recommendation that aviation should maintain broad access to the markets, interpreted by some governments as a reason not to introduce negative lists (of ineligible programs), or apply vintage restrictions or discounting that may limit supply further.

One example is the strong support among the aviation industry to have access to REDD+ credits. Part of the rationale presented is that it is easier to communicate the importance of forestry issues to consumers and the general public than, say, the CDM. But the industry's position relates also to a fear that UNFCCC mechanisms may be focused on, or at least sensitive to, governments meeting their national commitments, reducing the supply of UNFCCC-backed offset credits. Access to large voluntary markets such as REDD+ offer more assurance in terms of future availability, and would allow the sector to make long-term investments. Unlike ICAR that plans to take positive steps to create a reserve that would guard against market fluctuations in price, the ICAO approach to risk is currently characterized by avoiding any limitation of the market—an approach that carries its own risk, namely that the GMBM will be seen as having little or no environmental integrity. The key political challenge for

ICAO lies in demonstrating that the application of robust environmental criteria will not affect availability and price to the point where growth in the industry is significantly constrained.

While the principle of a reserve to help manage the risk of high prices could help to deliver this political objective, and from an environmental integrity point of view is preferable to a simple cap-busting ceiling, the ICAR proposal presents some difficulties for aviation. The most obvious is that the ICAO GMBM will not create any aviation-specific units that can be deposited in a pool of local reserves, or that can contribute to enabling connectivity between carbon markets (linking provisions).

One alternative approach would be for operators to fund the purchase of additional emission reduction units that comply with ICAR rules through a transaction levy on units purchased which could be deposited in the pool. Or the levy could go direct to ICAR to support an international support fund (as referenced by the World Bank). However, these ideas will face political challenges amongst ICAO Council members who rejected a similar concept—to have an offsetting scheme with a revenue-raising element—earlier in the negotiations.

It is likely that airlines would also oppose such a levy; if airlines are prepared to invest more to help manage risk, they will probably choose to purchase additional units directly and create their own asset reserve, which would remain under their control. Furthermore, industry enjoys significant influence over member governments at ICAO (who are represented generally by transport ministries). An ICAO-administered system would allow the industry to make input into decisions, but this influence diminishes if services are provided by third parties such as ICAR. This could make it difficult to secure industry support for ICAR and other services although much will depend on having a clear understanding of the rules that will control access to the reserve.

A consideration of the potential usefulness of ICAR would therefore need direct input from airlines. The market practices adopted by airlines in the EU ETS vary considerably, with some buying allowances early and selling or banking any surplus, and others waiting until they know the end of the compliance period to calculate their precise needs. This process has not been very transparent so the extent to which there is a need to create a central asset reserve is unclear. Aside from aviation, however, if ICAR developed amongst other clubs it would go some way to improving ICAO's confidence in the markets.

Assessment Framework for Carbon or Mitigation Value

As mentioned above, while GMTF is developing recommendations on eligibility criteria to determine which emission reduction units should be accepted in a GMBM, ICAO has given little consideration to the potential role of additional tools that could improve its overall environmental integrity such as vintage restrictions and discounting, which the European Commission and NGOs have been calling for. While such approaches are well understood, the nervousness about their impact on supply and the cost of compliance for operators has discouraged any consideration about whether they can improve the overall integrity of the GMBM.

Nevertheless, some governments and observer organizations do recognize the variable quality that exists across the jurisdictional and voluntary markets, and in some ETSs. This is fuelling fears that in the absence of such tools, and given ICAO's reluctance to date to agree a negative list and restrictions on activity type, that there will be little constraint on units, lowering the integrity of the GMBM.

An external system for valuing units could potentially offer a political compromise (by allowing all emissions units be used once an appropriate mitigation value has been applied), especially if it can address the difficult issue of assessing the environmental integrity of allowance units from emission trading systems. As with offset credits, ETS allowances will need to demonstrate that they possess a level of environmental integrity sufficient to meet ICAO's criteria. However, amongst other factors to be assessed, this requires ICAO, or another body, to consider the stringency of the cap. Caps are set for many reasons in addition to achieving an environmental outcome, including political and economic factors. ICAO needs to ensure that allowances are not accepted into a GMBM where the underlying cap is set at or substantially above a business as usual scenario.

While methodologies exist to perform such an assessment, many ETS jurisdictions may be nervous about allowing ICAO to 'audit' their cap and governance functions (not least the EU, following the political dispute over aviation's inclusion), since it may cause political embarrassment. Without the ability to assess, ICAO would be left with a straightforward choice between either allowing all allowances or excluding them entirely, with implications for integrity or supply respectively. GMTF has recommended that ETS jurisdictions wishing to sell

allowances to the GMBM could invite ICAO to make an assessment, but there is no agreed methodology for approaching this (options range from self-certification to an independent audit) nor any recommendation on who would perform it.

Industry's support for the inclusion of REDD+ has divided opinion amongst GMTF members based on the well-known concerns surrounding forestry. However, if industry's support for the GMBM is dependent on access to REDD+ units, and industry is seen as critical to a successful outcome, then there will be political pressure to include it. REDD+ has taken many steps to address concerns about integrity. At present the discussions are very polarized between accepting or excluding forestry. This high level discussion fails to recognize differences between voluntary and jurisdictional REDD and in relation to varying practice and governance at the program level. A methodology for differentiating between programs would be advantageous.

A valuing or discounting system as proposed for a basket of CMC systems and services, especially ICAO work, includes a GMTF paper on discounting of units, still under consideration, which could potentially address these issues. Governments may, however, be wary of losing control to a third party in relation to these decisions. China, in particular, has been cautious about early action because it feels that its own home-produced units may need time to attain the rigor required by ICAO's eligibility criteria and it doesn't want to appear on a 'negative list' in the intervening period. This political caution may argue for a technical advisory body appointed by ICAO and reporting to Council for a decision (as recommended by GMTF). Technically, a third-party valuing or discounting service should be attractive, but it may need to overcome political resistance to outsourcing. In this regard, it has the advantage that it is a trusted body and has the capability to deliver. ICAO has so far been reluctant to engage with rating agencies, fearing a lack of transparency, control and potential cost.

An International Settlement System (ISS) to Track Trades

GMTF has acknowledged that a registry structure must be created for the GMBM to ensure operational efficiency and transparency, and to manage the risk for GMBM participants and stakeholders. Several options have been under review including the possibility of using existing registries operated by other bodies (such as the UNFCCC's International Transaction Log, ITL), creating a centralized ICAO registry; or a series of coordinated registries overseen by ICAO.

Without issuing units of its own, ICAO's need for a registry (a means of tracking the transfer and cancellation of units across multiple markets) fits with the World Bank's concept of a settlement system that operates at a higher level than the jurisdiction or club itself. However, to be relevant the ISS must be operational by around 2018 to coincide with any early action so airlines and ICAO can gain experience.

Participation and Compliance Incentives for the Aviation Climate Club

A summary of the potential for CMC systems and services to create additional participation incentives for aviation, beyond those that may exist through ICAO's creation of a GMBM, is addressed in the following table (which draws on work by Keohane, Petsonk and Hanafi, 2015b):

Potential Incentive	Relevance to Aviation
Benefits from linkage, e.g., lower abatement costs	Limited: aviation is dependent on access to existing programs and ETSs, but, unless specified in the rules of a program or ETS, linkage will not be required
Reduced barriers to policy adoption, e.g., joining a club of markets will reduce cost and help with capacity building	Relevant as ICAO could benefit from advice and capacity on rules, governance and registries
Enhanced transparency and MRV through policy and technical support	Relevant given ICAO has no experience of carbon markets
Information exchange, institutional capacity-building, and policy coordination, e.g., visits and meetings, and CCM Secretariat	Relevant given ICAO has no experience of carbon markets
Enhanced access to low-carbon investment capital	May encourage investors to put money into projects that meet ICAO's eligibility criteria
Reputational benefits	May give markets more confidence in the ICAO MBM in its infancy
Exclusion of non-members	ICAO unlikely to want to restrict access to CCM members to ensure cost-effective supply

Implications

The suggested CMC services are intended to build confidence and widen the scope of the markets. For an aviation climate club, the need to build confidence ahead of the ICAO Assembly in autumn 2016 is very apparent. But in relation to scope, such an approach could usefully in fact provide the tools to enable ICAO to have more confidence to apply eligibility criteria in a manner that *constrains* access under the GMBM to high quality units.

So, in theory at least, suggestions for CMC services are relevant and potentially timely to issues being addressed by ICAO in its formulation of a proposal for a GMBM. If the ICAO Secretariat engages with the World Bank, however, timing will be essential. As mentioned, any ICAO agreement will come late in 2016 and while the offset requirement may not begin until 2020, operators may be required to submit data for 2018 and 2019. To contribute to ICAO's work to put governance and a registry in place, the CMC services would need to be sufficiently developed by 2017.

However, the services address only technical issues (with the exception of the systems to address risk that may also help to unlock political fears about the cost of participation, especially if they can address post-2020 markets) which, alone, are unlikely to contribute significantly to the prospects of a political agreement. While ICAO needs to have all its technical work complete and a clear plan for implementation if the GMBM is to be put in place by 2020, the more significant challenge in relation to a 2016 agreement is now political.

The same politics can be found in both UNFCCC and ICAO. In the same way that the Copenhagen COP failed in 2009 because governments were nervous about whether they could deliver the cuts being requested, governments in ICAO, especially developing countries, have been nervous about the impact of the CNG2020 goal. The emerging economies in particular have seen double digit annual growth rates in international aviation in recent years and are nervous about agreeing to a goal that they fear affecting their carriers disproportionately compared to the relatively mature, slow growing industries in Europe and North America. The original straw man proposal for differentiation was as follows:

"Basic Calculation

a) The basic calculation uses a combination of two rates. The "individual relative rate" is an operator's individual percentage of increase of its own emissions over the reference year relative to its emissions in the current year. The "sectoral relative rate" is the percentage of global quantity of emissions to offset in the sector relative to the global emissions of the current year.

b) An operator's obligation for the current year is composed of two parts: a collective part and an individual part. The collective part is the product of its own emission by the sectoral relative rate. The individual part is the product of its own emission by the individual relative rate, which equals to the variation in its own emissions over the reference year. These two parts are taken in equal proportion, 50% each."

The proposal was criticized however, for its potential to introduce competitive distortion, and ICAO is exploring variations including different combinations of the split between the individual and collective parts ranging from 100% individual to 100% collective and 75/25 and 25/75. Other options include a weighting placed on the individual and collective approaches that change over time (dynamic approach) and an 'Accumulative' emissions approach where operators offset obligations are based on their 'accumulative' historical emissions, e.g., from 1992–2020 (proposed by China). ICAO is also looking at the possibility of introducing route adjustments to ensure all operators flying on the same route are treated equally i.e., subject to the same obligations (as a percent of their emissions).

ICAO believes it is the most suitable forum to address all these issues and has so far reacted strongly to outside attempts to address aviation emissions. ICAO issued a Declaration to be communicated to COP21 reiterating its serious concern on the use of international aviation as a potential source for the mobilization of revenue for climate finance for other sectors in a disproportionate manner. At the same time, ICAO and UNFCCC have worked together to extend the CDM to aviation projects that fall outside the scope of the ICAO goal and the GMBM, implying that the organization is willing to collaborate on technical issues provided the discussion does not stray into policy.

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