Evaluating the Possibilities for an International Climate Change Regime

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Preface

This report is the culmination of the Workshop in Applied Earth Systems Management for the Master of Public Administration in Environmental Science and Policy at Columbia University's School of International and Public Affairs. In this capstone course, teams of students work with organizations on semester-long projects to deliver a high-quality professional level analysis of current issues important to the client's mission. Environmental Defense Fund (EDF) requested an analysis of past and existing international regimes and their commonalities with climate change negotiations, to provide insights on important focus areas to be considered as EDF forms its future path with respect to climate negotiations.

Executive Summary

This report is intended to identify important areas of focus for near-term international climate negotiations, to assist Environmental Defense Fund in their efforts to contribute to effectively decreasing global greenhouse gas emissions. These areas of focus were determined through extensive research and interviews with experts in academic, government, and private sectors.

Rising global average temperatures threaten our environmental, economic, and social systems, increasing the urgency of reducing greenhouse gas emissions. The most recent Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), COP 15 in Copenhagen, Denmark, failed to produce a legally binding global climate change agreement. The slow progress of international climate negotiations within the UNFCCC has prompted discussions to reconsider the range of possible approaches to reduce global emissions.

Designing policy to mitigate climate change is challenging because of the source of the problem: increasing emissions of greenhouse gases are inevitably linked to polarizing questions regarding development, equity, and consumption. The dynamics of current geopolitical regimes and the global economy, with stakeholders of varying interests and motivations, additionally compounds the complexity of reaching an international agreement to reduce global emissions. Within the current UNFCCC framework, the many polarizing issues inherently associated with climate change have been examined and discussed. The involvement of developing nations in negotiations has raised issues regarding differentiated responsibilities, equity, technology transfer, and financing, and a lack of a unanimous decision on these issues has stalled a global agreement. However, engaging developing nations in a climate agreement now may be critical because developing nations' emissions are anticipated to increase significantly with development and population growth.

The international community has struggled with these interacting issues in global climate negotiations within the UNFCCC. Many believe that due to the scope of a potential climate agreement, the legitimacy and authority of the UN is required to encourage cooperation, mediate conflicts, and to define standards for emissions reporting and verification. However, the unanimous voting procedure used in negotiations has resulted in inefficiency and a lack of agreement among all Parties. Negotiations that have considered other large-scale issues, such as the Doha Rounds of the World Trade Organization, have similarly faced stagnation and lack of consensus. In contrast, smaller-scale negotiations that have divided a problem into more manageable, issue-specific components, where negotiations bring together key stakeholders, have led to success. Negotiations that focus on the narrower components of a problem might operate more efficiently and engage key stakeholders in a forum appropriate for each issue. An examination of past international agreements suggests that, given the urgency of reducing global greenhouse gas emissions and the history of slow UNFCCC global negotiations, specific issues within the umbrella of climate change could be negotiated individually.

Organizations outside of the UNFCCC have begun to prioritize and discuss climate change among stakeholders sharing common goals. For example, the Major Economies Forum has convened discussions among national leaders, finance ministers, and environment ministers, and has targeted a variety of technological and other issues critical to reducing global emissions. The G-20 has also held discussions focusing on financing and adaptation. Bilateral dialogues between nations, such as the Strategic and Economic Dialogue between the United States and China, are also being utilized to further strategies in reducing emissions.

In considering the legitimacy offered by the UNFCCC negotiating platform in comparison to the efficiency gains that can be achieved in smaller negotiations in alternate forums, and with the recognition that efficient emissions reductions is the primary priority of any climate agreement, several focus areas have been identified as important considerations.

- Focusing on issue-specific, manageable goals by bringing together the key stakeholders could further progress on reducing greenhouse gas emissions in the near-term; for example, carbon capture and storage technology sharing negotiations could be advanced through the Major Economies Forum. In addition, the World Trade Organization could be an appropriate forum to discuss trade and intellectual property rights issues that will likely arise with technology sharing and with national emissions programs.

- The relationship between the United States and China, the largest emitters, could be enhanced by focusing on mutually beneficial clean energy goals through the existing Strategic and Economic Dialogue. Additional negotiating partners that exist between the United States and China in terms of economic and political structure, such as South Korea and Mexico, could enhance these negotiating dynamics. Cooperation between the United States and China is important for both multilateral or global negotiations, as well as advancing domestic legislation.

- In addition, financing mechanisms to legitimize both short- and long-term funding commitments and engage developing nations is an important goal that could be considered in the near-term, through using existing funding mechanisms to mobilize fast-start funding. Public funding commitments can also be leveraged to increase private sector funding.

As the causes and effects of climate change become increasingly apparent and problematic, the goal of immediate emissions reductions could motivate climate negotiations. This report identifies areas and forums that could be useful in facilitating cooperation and collaboration among stakeholders with the common goal of reducing greenhouse gas emissions and adapting to climate change.

Abbreviations

AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action under the Convention
BASIC block	Brazil, South Africa, India and China
BAU	Business as Usual
BRIC block	Brazil, Russia, India and China
BTAs	Border Tariff Adjustments
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CERs	Certified Emissions Reductions
CFCs	Chlorofluorocarbons
CLEAR Act	Carbon Limits and Energy for America's Renewal Act
COP	Conference of the Parties
EU ETS	European Union Emissions Trading Scheme
FIA	Fédération Internationale de l'Automobile
G-20	The Group of Twenty Finance Ministers and Central Bank Governors
G-77	The Group of 77 at the United Nations
GATS	General Agreement on Trade in Services
GATT	General Agreement on Trade and Tariffs
GEF	Global Environment Facility
GDP	Gross Domestic Product
Gt	Gigatons
IEA	International Energy Agency
IFFIM	International Finance Facility for Immunization
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
ITF	International Transport Federation
ITO	International Trade Organization
KORUS FTA	ROK-United States Free Trade Agreement
MEF	Major Economies Forum on Energy and Climate
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
REDD-Plus	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
S&ED	Strategic and Economic Dialogue
SBSTA	Subsidiary Body for Scientific and Technological Advice
TRIPS	Trade-Related Aspects of Intellectual Property Rights Agreement
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environmental Protection Agency
WTO	World Trade Organization

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I. Introduction

The 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) gathered in Copenhagen, Denmark, with the purpose of creating a comprehensive international climate change agreement as stipulated at COP 13 in Bali, Indonesia. With the Kyoto Protocol scheduled to expire in 2012, COP 15 was to serve as a pivotal point to usher in the passage of a new global climate change regime.

However, COP 15 failed to accomplish its stated goal of creating a legally binding climate change agreement. Instead, the Conference produced the Copenhagen Accord, an agreement that does not impose legally binding emissions targets, although the COP took note of the Accord. In part, the lack of official voting rules of procedure, and thereby the requirement of full consensus, hindered an agreement as demonstrated in the non-binding nature of the Copenhagen Accord.

However, the Accord does outline a process to move towards comprehensive international legislation. Commitments in the Accord include: a short term funding pledge from developed nations of $30 billion USD between 2010 and 2012 and a long term mobilization of $100 billion USD per year beginning in 2020; the immediate establishment of a mechanism for Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD-Plus); development of the Green Climate Fund, the proposed financial mechanism through which funding from developed nations would be utilized to assist developing nations with climate change adaptation and emissions abatement; and the creation of a High Level Panel to determine how best to fulfill the financial goals of the Accord. A separate panel, the UN Secretary-General's Advisory Group on Climate Change Financing, was also recently established and has a ten-month mandate, directed to determine proposals to increase both short and long term financing for adaptation and mitigation.

It is the goal of the Copenhagen Accord to incentivize participation from developing countries, a crucial element as such countries are not only most susceptible to the impacts of a changing climate, but are also home to the majority of the global population and future projected emissions. The intent of the funding is to assist developing nations in avoiding the emissions-intensive stage of development that would otherwise offset emissions reductions of the developed nations. To incentivize participation in abating emissions by assisting developing nations with their sovereign right to develop is a critical and fundamental role of this fund (S. Cohen, personal communication, 18 February 2010).

However, it is unclear if the commitments made to the fund are real. Funding for developing nations is a function of carbon credits and finance, and since the United States has so far been unable to define a federal carbon market, the funding promised to developing nations might have been more of a negotiating tactic than a financial reality (D. Victor, personal communication, 24 February 2010). The problem remains then that the Copenhagen Accord is a non-binding political agreement, not a COP decision. Unless climate change policy is implemented under the auspices and legitimacy of the COP and UNFCCC, the Green Climate Fund will most likely not be established. However, the funds that have been pledged by developed nations could still be administered by existing funding mechanisms (Schalatek et al., 2010). Furthermore, the perceived failure of COP 15 to produce a treaty may be viewed as a valuable reshuffling that, in terms of future efforts, may be better than a partial success (D. Victor, personal communication, 24 February 2010), as organizations have begun to reconsider the range of possible approaches to meaningfully reducing global greenhouse gas emissions (Keohane and Victor, 2010).

With the recognition that the urgency of climate change demands immediate action, this report presents a set of recommendations formed from an analysis of the strengths and weaknesses of existing methods employed to address international issues, as well as interviews with professionals in the public, private, and academic sectors, and considers potential alternatives to the current climate change institutional architecture. This report is intended to aid Environmental Defense Fund in identifying important areas of focus in their efforts to assist the

movement forward of an international climate change agreement. *Sections II* through *VI* provide essential background information, and *Section VII* provides recommendations for important areas of consideration, which are derived from a synthesis of this research.

II. The Complexity of the Problem

The challenges of designing climate change policy are a product of its complex source: greenhouse gas emissions, most notably carbon dioxide as a fossil fuel combustion byproduct. The increasing emissions of greenhouse gases since the onset of the Industrial Revolution exists at the nexus of economics, society, and science, and are inevitably linked to polarizing questions regarding equity of natural resource redistribution, development, and consumption. The dynamics of geopolitics and the inherent power structure of current international regimes with stakeholders of varying and oftentimes contradicting values and interests, such as equity, development, trade, and the global economy, further compound the complexity of reaching an international agreement (e.g., Kemfert and Tol, 2002; Stern, 2008). Furthermore, the impacts of a warming climate will disproportionately affect some countries, and will extend throughout centuries, a timeframe not typically considered when devising policy solutions. Therefore, the manner in which climate change is framed, and the importance given to these interacting issues, will shape the way that solutions are designed.

Scientific Certainty Within Uncertainty

Scientific understanding of modern climate change greatly increased with the formation of the Intergovernmental Panel on Climate Change (IPCC) in 1989. Peer-reviewed publications about climatic change have increased exponentially since the 1950s (Stanhill, 2001), and the periodic IPCC reports have become more decisive in describing the impacts of human activities on climate (Hegerl et al., 2007). Decades of peer-reviewed, multidisciplinary scientific research has led to widespread agreement that anthropogenic emissions of greenhouse gases in the industrial era have altered the natural course of Earth's climatic progression (e.g., Karl and Trenberth, 2003; Hansen et al., 2006; Le Treut and Somerville, 2007; Houghton, 2009). However, uncertainties remain as to the timing and regional distribution of projected effects due to the complexities in modeling vast quantities of incomplete historical data with the intricate dynamics of interacting ecosystems (Randall and Wood, 2007).

Geopolitical and Economic Issues

Political acceptance of climate change has not progressed in tandem with scientific understanding; the recent, popularly termed *climategate* media scandal (e.g., Revkin, 2009) is symbolic of the widespread political and social inertia in forming a consensus on the global immediacy of the problem. Within the United States alone, climate and energy legislation has stalled numerous times in various stages of the political process due to a lack of agreement. Although the Supreme Court's decision in Massachusetts vs. USEPA has enabled USEPA to use existing legislative authority under the Clean Air Act, this has stimulated several coordinated bills aiming to stall this form of regulation (see *Section VI*). This failure to reach agreement is demonstrated in the Copenhagen Accord, a compromise that grew from yet another lack of consensus (S. Barrett, personal communication, 18 February 2010; E. Bloomgarden, personal communication, 28 February 2010).

Disagreement results, in part, from the long time frame that needs to be considered for regional, national, or global climate change policies, because long time periods increase economic and geopolitical unpredictability. Most scientific assessments show modeled projections to at least 2100 (e.g., Alley et al., 2007), within which significant cost uncertainties exist in regards to abatement technologies and policies, while the modeling of economic impacts is also imprecise as the length of models increases (Stern, 2006). The Stern Review estimates that investment in emissions abatement in the early part of the 21st century may result in a loss of 1% to 3.5% global GDP by 2050, though estimates diverge approaching 2100 due to large uncertainties in the future costs of emissions reduction technologies (Stern, 2006). Cost estimates also differ depending on the geopolitical landscape, as governments vary widely in their capacity and interest in reducing emissions, in part because enacting national policies

or participating in a global effort has strategic importance in addition to functional motivations (e.g., Keohane and Victor 2010). For example, trade partnerships could be significantly affected by national climate policies, and may even drive discussions through coordinated groups such as the G-77 (J. A. Ocampo, personal communication, 5 March 2010).

The current economic climate and the downstream effects of the recession also complicate negotiations. While the credit crisis has been hard on the global economy, it has allowed climate negotiators some breathing room as the emissions growth rate slowed due to a decrease in industrial activity. Following a halving of the global emissions growth rate to 1.73% in 2008, early estimates predict 2010 emissions growth rates falling by another 2% to 3% (HSBC, 2010). Global energy demand also declined in 2009, for the first time since 1981, and global electricity demand contracted for the first time since the end of the Second World War (IEA, 2009). In addition, New Energy Finance (2009) estimates that the effects of the recession combined with continued efforts in efficiency and renewable energy could decrease the carbon footprint of the United States by 3.1% by 2020, effectively reducing emissions to 2005 levels even without domestic legislation.

However, the global recession has raised doubts about the efficiency of market mechanisms to reduce global emissions. While the global carbon market increased in value by 5% in 2009 (Figure 1), the voluntary abatement trading scandal and sideways carbon prices could apply downward pressure on carbon markets (New Energy Finance, 2009).

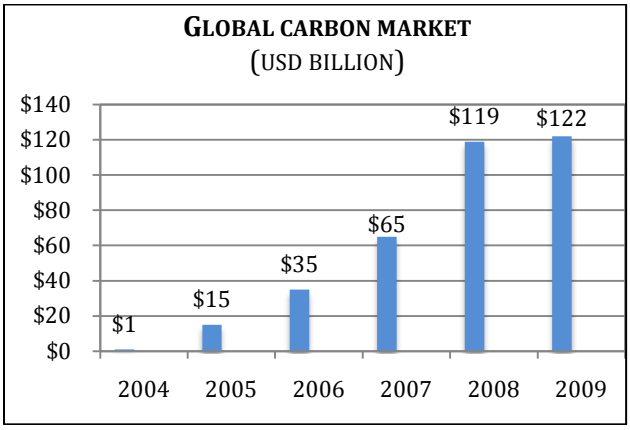

Figure 1. Global carbon market value from 2004 to 2009 (USD billion). Source: New Energy Finance, 2009.

The recent dynamics of the global recession and geopolitical interactions have revealed the many risks facing the successful agreement of a new global climate treaty. These factors need to be considered while moving forward with climate negotiations and towards a clean energy economy, and will be addressed in our recommendations (*Section VII*).

III. Specific Polarizing Issues in Climate Change Negotiations: A Focus on Developing Nations

Several polarizing issues challenge current international negotiations within the UNFCCC, as nations have differing perspectives and interests. Specifically, the involvement of developing nations in a global climate change agreement raises issues regarding differentiated responsibilities, technology transfer, and financing. These issues have been addressed within the UNFCCC negotiations but a lack of unanimity has stalled a global agreement, from the Kyoto Protocol through to COP 15. While negotiations involving only major emitters may be more successful at reaching agreement on emissions reductions and taking action in the short-term, long-term solutions will necessarily involve developing states due to global trends of population growth and distribution, and attendant increasing emissions. Developed states could move forward without dealing with issues of equity; however, the costs of ignoring such issues now could be prohibitive in the future (Murphy et al., 2009).

Equity and Differentiated Responsibilities

Addressing equity in a global agreement requires involving all developing countries more than would a solution with the goal of strictly reducing emissions. The principle of common but differentiated responsibilities, established in the UNFCCC and the Kyoto Protocol, substantially challenges reaching a global agreement (ISD Law, 2002). Developing nations argue that they have a right to achieve the prosperity of developed countries through economic growth. At

the same time, many of these nations will experience significant impacts of climate change due to less resilient infrastructure, a lack of financial resources, and a lack of capacity and technology for adaptation (Murphy et al., 2009).

The largest emerging economies, major players in the negotiation of the Copenhagen Accord, have stated their willingness to participate in the Accord, which largely removes the responsibility divide established under the Kyoto Protocol. However, the BASIC block of nations, including Brazil, South Africa, India, and China, has stated that the Copenhagen Accord will be recognized only as a tool for facilitating negotiations within the UN process (Devraj, 2010). This stance demonstrates that they believe the Accord does not give the principle of equity sufficient importance, and that they will likely not move forward unless developed states demonstrate action and financial investment in developing state adaptation and mitigation efforts (Devraj, 2010). Moreover, while they are willing to engage in negotiations outside of the UN framework, most developing nations seek the assurance of legitimacy, particularly in regards to funding support from developed nations, which the UNFCCC can provide.

Finally, even if minimizing issues of equity and focusing on the goal of greenhouse gas emissions abatement, engaging developing nations in a climate agreement now may be critical because an agreement needs to consider a long time frame, during which developing nations' emissions will likely rise. Two-thirds of greenhouse gas emissions in 2008 were caused by economic activities in non-OECD countries, and this share is expected to increase significantly with development and population growth (OECD, 2008; Murphy et al., 2009). The following outlines significant areas of consideration in negotiations involving developing states.

Technology Transfer

Emissions reductions in developing nations will require significant economic sacrifice at a time when momentum in economic growth is particularly important. In addition, the cost of emissions reductions relative to GDP may be higher for developing countries compared to developed countries (OECD, 2008). Given this imbalance in the costs and consequences of emissions abatement, developing countries will need affordable access to mitigation and adaptation technologies. Consequently, the restrictions of intellectual property rights (IPR) have been a source of disagreement within international negotiations. The protection of patents ensures that the benefits of innovation and advanced climate change technology development are rewarded through commercial monopolies and the compensation of research and development costs (Harvey, 2008; WTO, 2009). Furthermore, IPR has been demonstrated to increase productivity, trade flows, and foreign direct investment (Maskus, 2003).

However, although there are many benefits to IPR, they are considered both an incentive and hindrance to the transfer of technology to developing countries (ICTSD, 2008). IPR put a price premium on technology, though the cost of the output of the technology does not necessarily increase. Moreover, exclusive patent rights may increase the price of goods that are created from innovative technologies, and in turn, make them unaffordable to lower income developing countries (Copenhagen Economics, 2009). Developing countries have raised this issue at UNFCCC conferences in reference to the World Trade Organization's (WTO) Agreement of Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement). The TRIPS Agreement allows certain circumstantial exemptions to the protection of IPR. These exemptions, however, have been applied sometimes controversially. Compulsory licenses, for example, can be granted without the authorization of the patent holder for public non-commercial uses during emergencies (ICTSD, 2008). At the Beijing international conference on carbon technology transfers in November 2008, China and India proposed the use of this flexibility for carbon abatement technologies. Japan and the EU opposed, because carbon abatement technology patents are held by a large number of firms in these nations, which will limit their overall market power (Copenhagen Economics, 2009). As technology transfer becomes an increasingly important issue in climate negotiations as a way to equitably engage developing nations, challenges to IPR will further entangle trade issues with emissions abatement goals.

Financing and Developing Countries

The struggle to come to an agreement on financial structures to supply funding to developing countries for adaptation and mitigation is another significant

concern in negotiations. Developing countries are negotiating for increased funding flows from developed countries, with fewer bureaucratic hurdles and reduced involvement from organizations like the World Bank, while developed nations are demanding assurances of transparency in the use of funding. However, as shown in Figure 2, estimates of needed funding vary significantly: projected costs for mitigation range between $65 billion USD to $200 billion USD per year by 2020 and estimates for adaptation range from $40 billion USD to $67 billion USD annually by 2030 (HSBC, 2009).

Two primary suggestions for a financial architecture have emerged from past negotiations. Developed nations suggest that existing multilateral and bilateral funding organizations, such as the Global Environment Facility (GEF), World Bank, regional development banks, and bilateral donor agencies, should provide the needed capacity due to institutional and technical knowledge (World Wildlife Fund, 2009). Alternatively, the G-77 and China has suggested a centralized system whereby an operating body with equitable and balanced representation of all countries would be accountable directly to the COP (Figure 3; UNFCCC, 2008). Little advancement was made in terms of long-term financing at COP 15 (Mueller, 2007), and the UN Secretary-General's Advisory Group on Climate Change Financing was developed to make financing recommendations to COP 16. These disagreements in funding and funding mechanisms stall developing nations' action on climate change, as they want guaranteed demonstrations of credible funding commitments from developed states. Mobilizing existing funding commitments should assist in establishing the legitimacy of global dedication to climate change mitigation and in turn promote action.

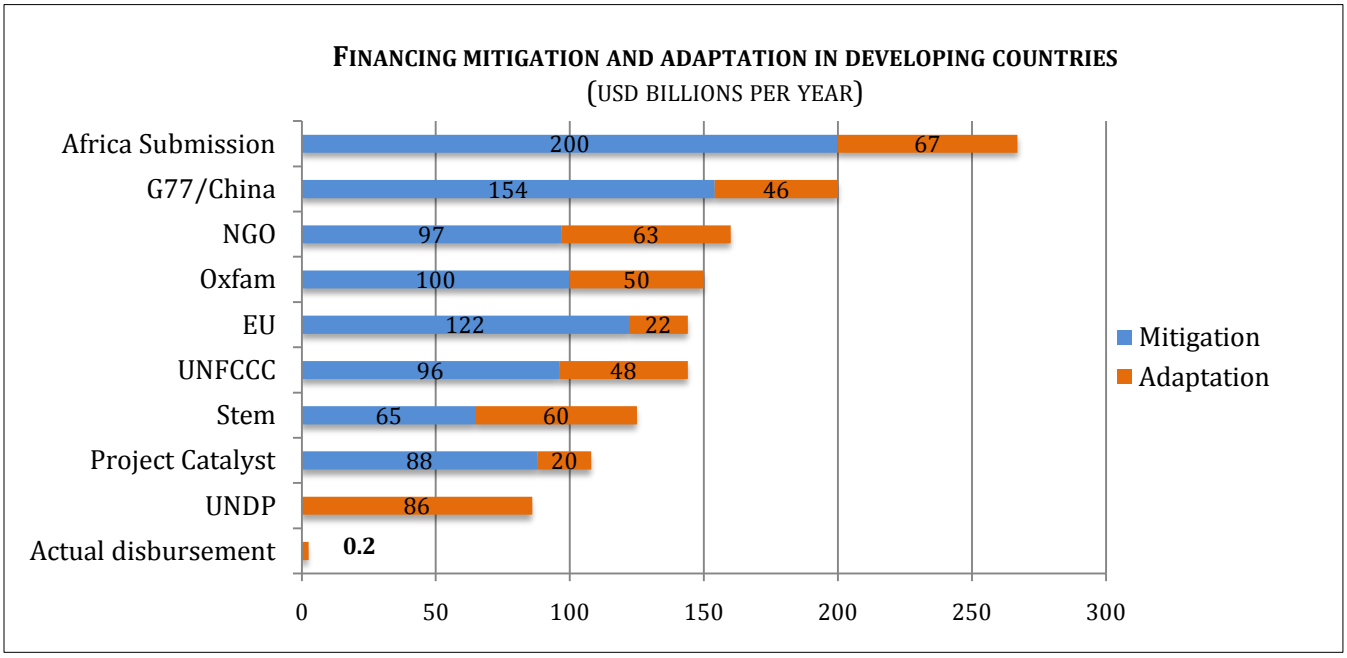

Figure 2. Required funding estimates for adaptation, mitigation, and technology transfer to developing nations. Source: HSBC, 2009.

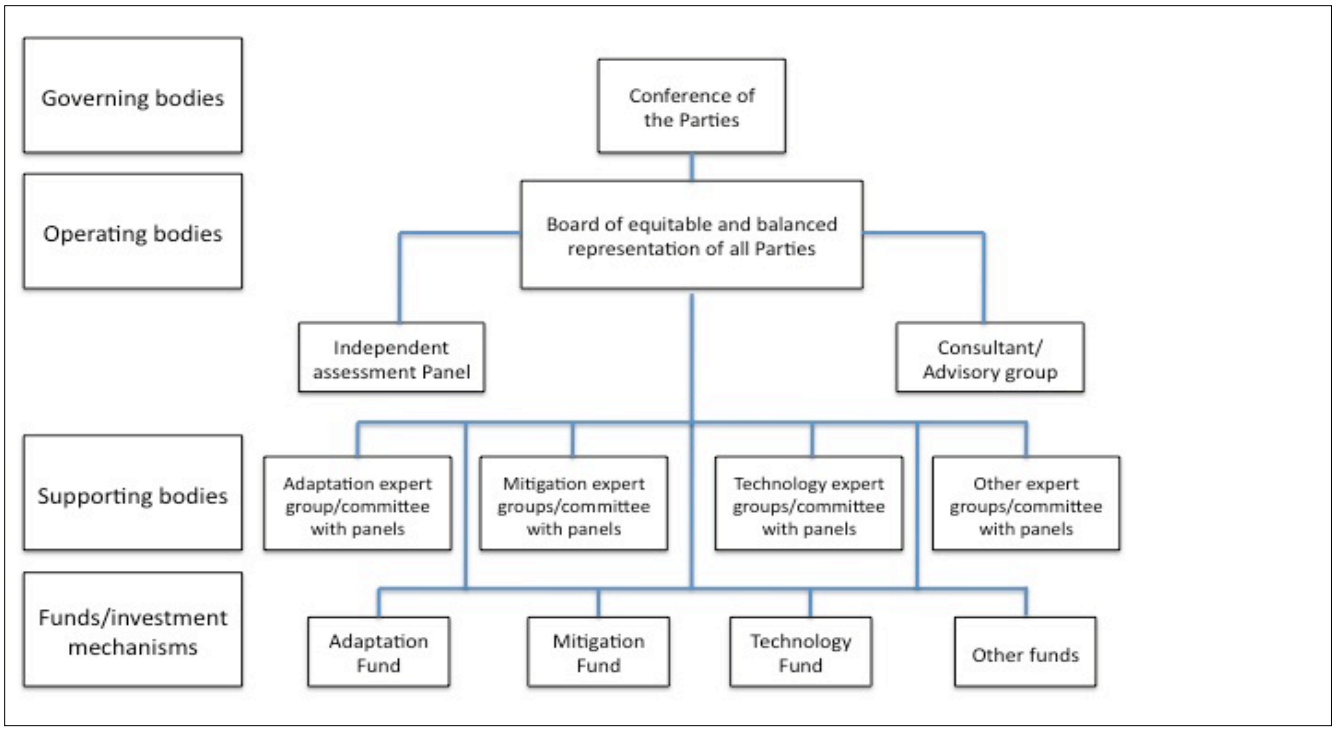

Figure 3. Proposed institutional arrangements, from the G-77 and China, to disperse UNFCCC financial resources. Source: Adapted from UNFCCC, 2008.

IV. International Agreements: Problems, Possibilities and Opportunities

The international community has struggled to find a way forward with an agreement that would balance efficiency and equity in a global climate change agreement. Motivated by varying interests, countries have been unable to reach consensus under large, multilateral forums in which an inability to compromise on specific issues leads to breakdowns in negotiations that then stalls or renders the process ineffective. The Doha Rounds of the WTO exemplifies negotiation stagnation in a large forum, whereas the Kyoto Protocol demonstrates that without key players, any international emissions abatement regime will be ineffectual. In contrast, dividing a large problem into more manageable, issue-specific components, where negotiations bring together relevant stakeholders, such as occurred with the Montreal Protocol and the REDD-Plus discussions, can lead to greater efficiency and success.

Kyoto Protocol and Clean Development Mechanism

In its current form and without the participation of several key players, the UNFCCC has not been successful in organizing a cohesive international carbon emissions reduction regime. However, some achievements have emerged from the UNFCCC, most notably the Kyoto Protocol. Although lacking incentives and enforcement (e.g., Barrett, 2005), the Kyoto Protocol has led to emissions reductions in some signatory nations and introduced the Clean Development Mechanism (CDM). The CDM is the first multilateral, market-based mechanism to address climate change and the redistribution of technology to developing countries. As a market mechanism, CDM has been successful at emissions abatement with technologies of optimal cost-efficiency. As of 2005, 717 million metric tons of carbon dioxide equivalent emissions were abated, approximately the equivalent of the annual emissions of France and Spain combined (Lecocq and Phillippe, 2007). However, in

emphasizing cost efficiency and not rewarding riskier costs (e.g., in countries with less developed infrastructure), a significant majority of CDM projects are low-cost projects undertaken mostly in China and India as African and South American countries are ignored (Olsen, 2007).

The WTO and the Doha Rounds

The WTO has its origins in the International Trade Organization (ITO), created following the end of World War II. Proposed by the United States at the same time the General Agreement on Trade and Tariffs (GATT) was being negotiated, plans for the ITO disintegrated when President Truman withdrew ratification due to Congressional resistance. GATT, therefore, served as the basis for the international trading system for almost fifty years until it was incorporated into the WTO in 1995 (WTO, 2010a). The GATT proved successful overall in reducing tariffs despite a lack of an institutional framework (van den Bossche 2005). From the Uruguay Rounds in 1986 to the signing of the Marrakesh Accords in 1994, these efforts launched the first multilateral trade organization and several agreements under its umbrella, including a revised GATT and two new agreements, the General Agreement on Trade in Services (GATS) and TRIPS (WTO, 2010b). In addition, the 1994 Uruguay Rounds established the architecture for a structured dispute process, including a fixed timetable and the establishment of a Dispute Settlement Body not affiliated with any governments (WTO, 2010c).

The Doha Rounds of 2001 slowed multilateral trade talks to a standstill as developed countries and the developing world became deadlocked over two main issues: continued disagreement over the special safeguard mechanism used to protect domestic farmers in developing countries from agricultural import surges, and voluntary sector-specific agreements to significantly reduce manufacturing tariffs (Markheim, 2008). Pascal Lamy, Secretariat of the WTO, has requested that countries resume the Doha Round this year; however, both developed and developing countries are displaying similar degrees of reticence, exacerbated by the financial crisis.

In relation to the UNFCCC climate negotiations, the following lessons may be considered. While the ITO was unsuccessful, the GATT continued to move forward, eventually evolving into the relatively successful WTO. In light of the mixed results at COP 15, the evolution of the WTO suggests that despite continued stalling of the UNFCCC negotiations, fragmented efforts, perhaps plurilateral at first and multilateral over time, could eventually succeed. However, the urgency of emissions reductions cannot afford to wait for a strong multilateral effort on climate change to emerge without coordination over decades.

Over the last decade several experts have discussed linkages between trade/WTO and climate change (Zhang, 1998, 2004, 2007, 2009; Petsonk, 1999; Hufbauer and Kim, 2009; James, 2009; Tamiotti et al., 2009; Keohane and Victor, 2010). They encompass several lines of thought but discuss in particular sanctions through tariffs, or more specifically border tariff adjustments (BTAs). Some studies suggest that the effectiveness of BTAs shows promise in motivating participation in multilateral environmental agreements. A dynamic global warming game model described by Lessmann et al. (2009) suggests that a coalition of countries could induce participation by enforcing BTAs and punishing free riders. This model indicates that when tariffs are relatively small, so as not to hurt the coalition members enacting the BTAs, participation and the global social welfare increase (Lessmann et al., 2009). Another study from Tian and Whalley (2009) analyzes the feasibility of sanctioning the BRIC countries (Brazil, Russia, India and China) to induce participation in global environmental treaties. The results of this model suggest that if the damages from climate change are substantial and if developing countries are net exporters (all BRIC countries except India) they will be more likely to comply.

The WTO's stated policy on climate change has been largely removed, but the WTO has responded to the international community's concerns that any international climate agreement will not be interfered with. Secretariat Lamy has stated that the WTO does not see it necessary to intervene with multilateral environmental agreements. A major collaborative step for the WTO was the issuance of a joint Trade and Climate WTO-UNEP Report (Tamiotti et al., 2009), which provides considerable guidance on how BTAs would need to be designed to be WTO compliant. However, while it may be possible to design WTO-compliant BTAs, they could be perceived as a threat to

the multilateral trading system and may hinder climate negotiations (Bhagwati and Mavroidis, 2008; James, 2009; Keohane and Victor, 2010; Veel, 2009). If a BTA could be designed to conform to WTO law, it could create resentment among targeted countries and motivate countervailing trade measures (Veel, 2009). Before negotiations could reach the WTO's Dispute Settlement Body, the countervailing measures may prompt trade disputes that could depress the international economy (James, 2009). Even subtle proponents of BTAs (Keohane and Victor, 2010) concede that they could have unintentional negative effects.

The breakdown of the Doha Rounds provides an opportunity to draw parallels with climate change agreements and to identify what issues require more nuanced dialog before entering negotiations. Although the Doha Rounds have not resumed, small trade issues continue to be negotiated, laying the foundation for compromise that may pick up where Doha left off.

The Kyoto Protocol under UNFCCC and the Doha Rounds of the WTO are examples of large-scale negotiations and agreements that have experienced inefficiencies and delays, though these inclusive, multilateral institutions lend the process a legitimacy that smaller, more exclusive agreements do not possess. However, the urgency of reducing global greenhouse gas emissions has led some to suggest that approaching an agreement through smaller-scale negotiations may increase efficiency, and could be used to support a larger framework (La Vina, 2010; S. Barrett, 18 February 2010, personal communication). The negotiations that led to the Montreal Protocol and the discussions that are currently working towards a REDD-Plus agreement are considered examples of dividing a large problem into more manageable, issue-specific components, and bringing the relevant stakeholders into the discussions.

The Montreal Protocol

Concerns about ozone-depleting chlorofluorocarbons (CFCs), used in several industrial sectors, motivated the organization of the Vienna Convention for the Protection of the Ozone Layer in 1985. Following numerous meetings and workshops and increasing public awareness after the Vienna Convention, the Montreal Protocol was created in 1987 (United Nations Ozone Secretariat, 2007) with the goal of reducing the production and consumption of CFCs to protect the ozone layer.

There have been seven revisions, with the latest taking place in Beijing in 1999. It is believed that if the treaty is followed, the ozone layer will recover by 2050. The Montreal Protocol stipulated the following: panels of experts in areas of science, environment, technology, and economy would be established by 1989 and a review would be published in each of these areas every four years; both production and consumption would be regulated; flexibility of the implementation mechanism was ensured, as numerical goals were set by the treaty but the method to meet them was determined by each nation; trade could be restricted with countries that had not ratified the Protocol (GATT contributed to this provision); a grace period was established for participating developing countries and the Multilateral Fund for the Implementation of the Montreal Protocol was created in 1990 to aid developing countries in meeting targets; a non-compliance regime was established in 1990; and in the absence of consensus, a majority of both developed and developing countries must be in agreement for votes to pass (instead of majority vote being equal to parties representing 50% of total consumption of substances covered by the Protocol).

Twenty-four countries signed the Protocol at its induction and as of 2006, 191 countries had ratified. In total, the use of ozone-depleting substances has been reduced by 95% with developing countries reducing CFC consumption by 72% (United Nations Ozone Secretariat, 2007). Developed countries have phased out production and consumption of chemicals controlled by the Protocol by over 99% (United Nations Ozone Secretariat, 2007). The Montreal Protocol is therefore described as an example of an international environmental agreement that was successfully achieved and effectively implemented.

Understanding the reasons for this success may assist with developing a successful climate change agreement. One important factor in the development of the Montreal Protocol was the involvement of the private sector. The Alliance for Responsible CFC Policy supported limits on the use of CFCs and this was very influential in the passage of this international treaty

(United Nations Ozone Secretariat, 2007). Furthermore, although the original requirement of the Montreal Protocol mandated CFC production and consumption to be cut by half by 1999, compared to 1986 levels, the agreement could be amended periodically. A two-thirds majority vote could change the requirements at any time and the Protocol would only enter into force if a minimum of 11 countries ratified it, comprising at least two-thirds of global consumption of CFCs. This flexibility induced the United States, who had wanted a mandatory 100% participation in order to sign on, to concede to the two-thirds global consumption threshold (Barrett, 2005).

Another factor leading to success was that CFC reduction was also cost efficient. A cost-benefit analysis of participation against non-participation in the Protocol demonstrated that the benefits far outweighed the costs, even if the United States were the only country participating (Barrett, 2005). However, in order for CFCs to be reduced in the long run, developing countries had to participate, and this was achieved with financial incentives in which developed countries agreed to significant payoffs to developing countries for the incremental costs of compliance. Another important factor was that there were significant advances in technology and substitutions for CFCs, which made the transition less costly than anticipated (Barrett, 2005).

While some contend that a reduction of CFCs was a step that countries were already willing to make before the Montreal Protocol was enacted, implying that the Protocol is more a symbol of international cooperation rather than an outcome of successful international negotiations (Murdoch and Sandler, 1997), the phase-out of CFCs was effectively achieved under the Montreal Protocol. The cooperation required was likely attained because the negotiations were issue-specific, and thus focused the negotiation process. Private sector involvement and flexibility in implementation also contributed to the success of this process.

REDD-Plus

A current example of targeted negotiations is the continuation of the REDD-Plus discussions. Refusing to be constrained by the current impasse, or to let the continuous hard work of the last five years languish, those involved in the avoided deforestation issue, which accounts for approximately 17% of global greenhouse gas emissions (IPCC, 2007), have forged ahead with the goal of making a REDD-Plus mechanism operational. Lead facilitator Tony LaVina used a variety of negotiating techniques to bring stakeholders together in small groups to work through differences prior to arriving at the time-crunched, high-pressure COP negotiations (LaVina, 2010). In this case, because the focus was on a contained issue, countries involved in the negotiations were able to come very close to an agreement by the end of COP 15. Negotiations will continue throughout 2010, both in the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) and the Subsidiary Body for Scientific and Technological Advice (SBSTA), as well as outside of the UNFCCC; an informal meeting has been held in France, with another planned in Norway in May 2010. The goal is that by COP 16, there will be an interim agreement on REDD-Plus. In this case, REDD-Plus could continue to move forward, even if there is no climate agreement reached at COP 16, though REDD-Plus could be added to a global agreement when it is attained.

A comparison of global negotiations that engage in large-scale issues, such as trade and climate change, to negotiations that approach more issue-specific, achievable goals, demonstrates the utility of separating large problems into smaller components. Negotiations that focus on the narrower components can not only operate more efficiently and flexibly, but can also target the relevant stakeholders in a forum appropriate for each issue. This examination of past international agreements suggests that, given the urgency of reducing global greenhouse gas emissions and the history of slow UNFCCC global negotiations, specific issues within the umbrella of climate change could be negotiated individually. However, the purpose of nesting climate change negotiations within a UN entity is to promote legitimacy by maximizing inclusivity (Evans and Stevens, 2009; Little, 2010), though a fragmented approach provides greater efficiency.

V. Climate Negotiations: the UNFCCC and Additional Forums

The UNFCCC provides legitimacy because global governance ensures a framework for the global community to collaborate and cooperate, and creates standards for conduct, and allows for the reconciliation of differences (Razman et al., 2009). In theory, to be effective and legitimate, an international regime must: be recognized and supported by the world community; be consistent with existing international regimes; have the mandate and capability of enforcement; use transparent institutionalized rules and compliance procedures in decision-making; and be in agreement with established international principles, norms and laws (Huang, 2009). The UNFCCC meets these criteria because of affiliation with the UN and, in particular, because of the participation of nearly all of the UN members (Huang, 2009). However, the UNFCCC negotiations have been arduous not only due to the complexity of issues that must be addressed and the number of Parties, but also due to the accepted norm of unanimous consensus. Keohane and Victor (2010) illustrate a continuum to frame the international climate change regime complex: on one end of the continuum is the comprehensive, UNFCCC structure that provides legitimacy, and on the other end is a fragmented regime complex that includes variable and disconnected issue-specific initiatives within organizations or nations, which provides efficiency in negotiations. The optimal solution is to find a balance within this continuum that addresses the urgency of emissions reductions and allows for a more efficient multilateral coordinated engagement, and does not neglect the key principles of the UNFCCC process.

At the fragmented end of the continuum, organizations outside of the UN composed of stakeholders sharing common goals have begun to emerge and discuss climate change. These groups can be useful in government networking and consensus building as well as forums for collaboration on aspects of the problem of climate change (Huang, 2009). Members of these groupings include market institutions, trade regulators, legal regimes, expert assessments, development banks, and other interested parties, who have developed as key participants and stakeholders in devising and implementing national or regional climate change policy (Keohane and Victor, 2010). Characteristics of these outside entities could prove advantageous to the negotiation process. Reducing the number of stakeholders negotiating an issue would increase the efficiency of negotiations, and when negotiating specific issues that are not necessarily important to every party of the UNFCCC, it would make sense to bring only the relevant stakeholders to the discussion. For example, fostering international partnerships among the countries that are dominantly funding and developing technology could speed technology transfer.

The Major Economies Forum on Energy and Climate (MEF), created in 2009 to lead discussions among major developed and developing economies prior to COP 15, represents a unique venue for advancing issue-specific goals. The MEF brings together national leaders, finance ministers, and environment ministers, and has targeted a variety of technical issues that are critical to achieving mitigation and adaptation goals; clear leadership roles have been assigned to participating states in areas such as carbon capture and sequestration and the development of smart grid technology. The MEF includes both a representation of the diversity of countries involved as well as a focus on many of the major issues that threaten successful negotiation of a climate change agreement. Specifically, the MEF could be used as a venue to promote technological innovations that assist both adaptation and mitigation goals, as the publication of the Technology Action Plans demonstrates (see Table 1). Through the definition of these roles, the MEF aims to foster responsibility, trust and familiarity among the participating nations; the Copenhagen Accord was negotiated among a subset of countries that included all of the MEF members, which suggests that the earlier MEF meetings fostered some level of cooperation and shared responsibility (Little, 2010). Furthermore, as the recent global negotiations have become increasingly complex and challenging, the MEF may represent a forum where the appropriate negotiators, those who can effectively implement national changes, are brought together to discuss

issues and avoid the larger negotiation stagnation and pressure.

The G-20 also held specific meetings focused on financing, mitigation and adaptation in developing nations prior to COP 15, though was unsuccessful in coordinating a position among members. The G-20 has the underlying goal of supporting growth and development worldwide, and was formed as a response to the problem that emerging economies were not being included in global economic discussions. The structure of the G-20 allows for relatively equal representation of member countries, and often faces challenges because some members, such as some European Union countries, are reluctant to surrender their individual influence in global policy forums (Keohane and Victor, 2010). This inclusivity of many competing interests and a focus on agreement likely led to the lack of cooperation at meetings prior to COP 15; the problems hindering agreement within the UNFCCC also impeded agreement within the G-20 (Ertel, 2009).

Table 1. Proposed programs in the MEF Technology Action Plans. Source: MEF, 2009.

ACTION TOPIC	MITIGATION POTENTIAL	POTENTIAL ACTION
ADVANCED VEHICLES	Improve light duty vehicle fuel efficiency to achieve a 30–50% reduction in new light-duty vehicle fuel consumption.	Endorse the 50 by 50 Global Fuel Economy Initiative (GFEI), a proposal to increase fuel efficiency 50% by 2050. Proposed jointly by UNEP, the IEA, the ITF, and the FIA Foundation.
BIOENERGY	Effective deployment of biofuels to reduce fossil fuel consumption.	Identify principles, conditions, and institutional frameworks to best facilitate the deployment of technologies for sustainable bioenergy. Establish or enhance frameworks for widespread cooperative action to shift from traditional to modern bioenergy.
CARBON CAPTURE & STORAGE (CCS)	Global deployment of CCUS is projected to capture 10.1 Gt in 2050, with 55% of captured CO_2 coming from the power sector, and 45% from industrial and upstream sources. The cumulative storage of CCS from 2010-2050 is estimated at 145 Gt CO2.	Take steps to ensure the fulfillment of the G8 commitment to support the launch of 20 commercial-scale CCS projects by 2010 and recognize that by 2020, many more could be required in both developed and developing countries, which may need assistance from developed countries.
BUILDINGS SECTOR ENERGY EFFICIENCY	Reduction of energy consumption in buildings below baseline levels by 41% in 2050, corresponding to 11.5 Gt (or roughly 40%) of total global fossil fuel CO2 emissions.	Establish domestic (and/or international) centers focused on key efficiency drivers (e.g., lighting, insulation, roofing, windows, heating, ventilating, air conditioning).
INDUSTRIAL SECTOR ENERGY EFFICIENCY	Global industrial emissions to be reduced by 53%, or 4 Gt CO_2 equivalent (Gt CO2e), by 2030.	Promote and fund energy efficiency research for multi-industry efficiency (e.g., steam systems, motors design and usage, water, industrial buildings, etc).
HIGH EFFICIENCY, LOW-EMISSIONS COAL (HELE)	Clean fossil fuel power generation has the potential to reduce emissions by 1.6 Gt CO_2e by 2030.	Formulate roadmaps for HELE coal technologies to enhance domestic and international research and development efforts for HELE coal technologies through public/private partnerships.
MARINE ENERGY	Annual global marine energy potential is estimated to be many times greater than global energy demand, but remains theoretical due to technical, economic, administrative, and environmental constraints.	Provide research and development funding for marine energy technologies based on strategic research agendas and identify potential areas for joint cooperation between countries.
SMART GRIDS	The electricity network is of central importance to a carbon-constrained energy system and smart grids are a key enabler for other CO_2 reduction technologies and solutions.	Develop global smart grid technology strategies to work with current research initiatives to integrate and align current development efforts across the globe.
SOLAR ENERGY	Solar energy could contribute nearly 4.5 Gt of CO2 emission reductions in 2050. Several industry estimates are considerably higher.	Provide, as appropriate, sufficient test facilities and demonstration projects to address specific needs of new and emerging technologies.
WIND ENERGY	Wind could contribute 12% of global electricity generation and about 3.3 Gt of CO_2 emission reductions, while some wind industry estimates are significantly higher.	Follow a combined approach of research and development and deployment policy that would benefit from economies of scale and transfer effects from research to mass-scale testing.

VI. Unilateral and Bilateral Climate Policy Progress

In addition to progress within the UNFCCC and multilateral discussions in forums such as the MEF and G-20, national-level and bilateral energy and climate initiatives are also important for reaching a global agreement and reducing emissions. If individual countries already have goals and policies for greenhouse gas emissions reductions in place, an agreement among countries could be easier to achieve. Any global agreement must respect the actions that a country can feasibly take within its own circumstances (S. Barrett, personal communication, 18 February 2010), and thus as nations develop their own timeline for action, they can enter global negotiations with a focused plan for moving forward. Several nations, including China and the United States, have advanced such policies at the state or national level, while many other nations have entered into bilateral agreements or discussions. Examples of climate change initiatives by some developed and developing countries are outlined in Table 2.

Table 2. Examples of climate change initiatives of major greenhouse gas emitting nations.

Country	Initiative	Details
Canada	January 2010: Economic Action Plan's Clean Energy Fund[a]	Outlines increased expenditures to promote clean energy technology research.
	February 2009: Clean Energy Dialogue with United States[b]	Goal is to enhance collaboration on clean energy technology and reduce greenhouse gases emissions.
China	June 2007: National Climate Change Programme[c]	Focuses national priorities on increasing renewable sources of energy while increasing the energy efficiency. Also includes afforestation campaign and public awareness initiative.
	February 2006: Medium-to-Long-Term Science and Technology National Plan[d]	Includes support for target growth industries, including renewable energy development and manufacturing sectors.
Germany	January 2008: Climate Initiative[e]	Through sale of emissions allowances under EU ETS, can finance renewable energy technology research and support climate protection projects in developing countries.
	July 2004: Renewable Energy Sources Act[f]	Goal of 25-30% of country's electricity produced by renewable sources by 2020.
India	October 2009: Agreement on Cooperation on Addressing Climate Change with China[g]	Goals include (1) establish India-China partnership to strengthen bilateral dialog and cooperation; (2) recognize equal priority of adaptation and mitigation; (3) establish India-China working group on climate change.
Japan	October 2008: Trial emissions trading program[h]	Voluntary system, established with goal of leading to mandatory system with imposed company targets.
	June 1998: Guidelines of Measures to Prevent Global Warming[i]	Coordinated policies across agencies and provinces.
Russia	May 2009: Climate Doctrine[j]	Focuses on adaptation, includes measures to enhance efficiency of Russian economy, does not commit to any emissions restrictions.
United Kingdom	October 2008: Department of Energy and Climate Change[k]	Focuses on nation's energy and climate change policy in parallel, secures global commitments towards preventing climate change
	Climate Change: The UK Programme 2006[l]	Goal of reducing emissions 20% below 1990 levels by 2010 and 60% below 1990 levels by 2050.
United States	April 2007: Supreme Court gave USEPA the authority to regulate carbon dioxide and other greenhouse gas emissions under the Clean Air Act[m]	Greenhouse gases classified as pollutants that endanger public health and welfare and set in motion a process for regulation through command-and-control approach.
	February 2007: Western Climate Initiative[n]	Regional initiative that requires participating states to reduce emissions 15% below 2005 levels by 2020.

Source:[a]Natural Resources Canada, 2010, [b]Government of Canada, 2009, [c]China National Climate Change Programme, 2007, [d]Gordon et al., 2010, [e]Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, 2009, [f]Renewable Energy Sources Act, 2004, [g]China Climate Change Info-Net, 2009, [h]van Asselt et al., 2009, [i]Japan Ministry of the Environment, 1998, [j]Barents Observer, 2009, [k]Department of Energy and Climate Change, 2010, [l]Department of Energy and Climate Change, 2010, [m]Broder, 2009, [n]Lutsey and Sperling, 2008.

A further analysis of China and the United States is necessary when considering global greenhouse gas emissions, because China and the United States represent the largest share of global emissions and can be considered the leaders of the developing and developed worlds in relation to climate negotiations. Therefore, climate change initiatives and agreements that involve these two countries are important for reducing global greenhouse gas emissions as well as provoking other nations to participate.

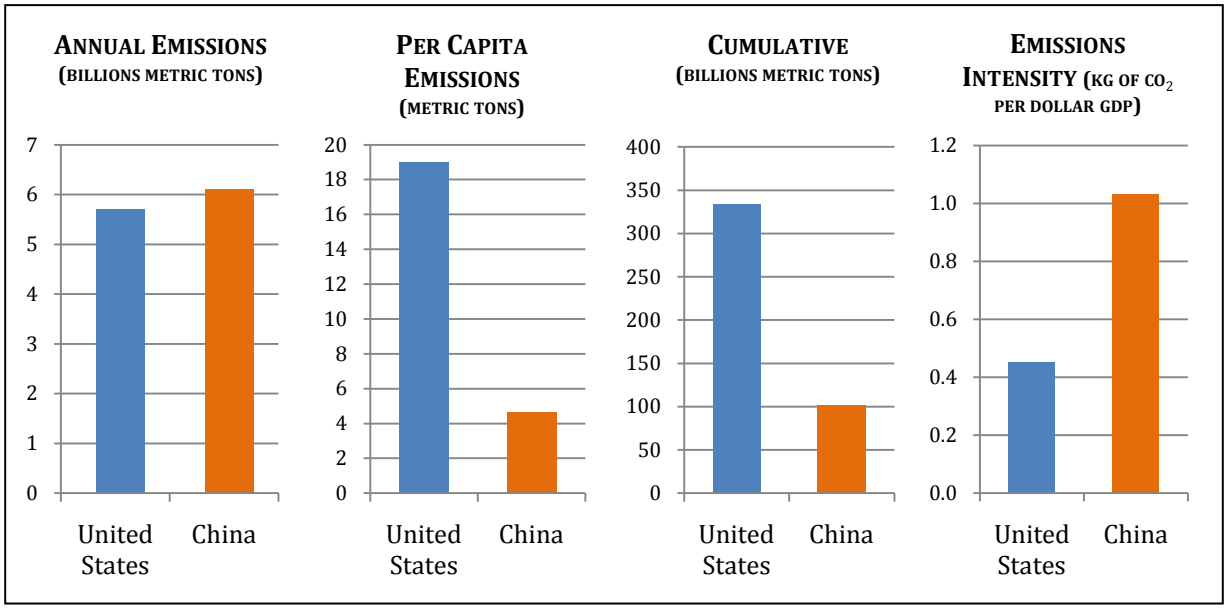

Figure 4. Greenhouse gas emissions levels in China and the United States as of 2006. Source: Millennium Development Goals Indicators, 2009.

China

In an effort to reduce national pollution levels and to increase global economic competitiveness, leaders in China are invigorating the renewable energy sector through domestic legislation. While the Chinese government is focused on providing its industries and citizens with the energy necessary to expand the national economy, China has placed increasing importance on energy efficiency (Gordon et al., 2010). Through policy incentives, China achieved a decrease in energy intensity at an average annual rate of 4.1% between 1990 and 2005 (China National Climate Change Programme, 2007). These policy initiatives include the National Climate Change Programme, the Medium-to-Long-Term Science and Technology National Plan, and major initiatives in the 11th Five-Year Plan.

China's National Climate Change Programme (2007), the first such program in a developing country, focuses national priorities on increasing the use of renewable sources of energy while increasing the efficiency of oil and gas. This program also includes an afforestation campaign, a public awareness initiative, and an increase in support for climate research. Other significant environmental and energy goals within China's Medium-to-Long-Term Science and Technology National Plan (2006) include support for target growth industries, including renewable energy development and manufacturing sectors (Gordon et al., 2010).

In November 2009, China announced a plan to reduce carbon dioxide emissions as a proportion of GDP by 40% to 45% of 2005 levels by 2020. Strategies in support of this goal expand on existing policies to set targets for energy and resource efficiency across a range of industrial sectors. For example, the Renewable Energy Law requires electricity distribution firms to purchase a specific percentage of their electricity from

renewable sources, a quota system. Furthermore, mandates for renewable energy generation for power generators, fuel efficiency standards, energy price reform, and policies promoting China's wind strategy provide a road map for achieving China's most ambitious energy intensity reduction targets to date (Gordon et al., 2010). Despite these progressive goals, unrelated domestic policies will likely affect the efficacy of energy legislation. China's stimulus funding to its economy in reaction to the global financial crisis subsidized energy and pollution intensive sectors (Shi, 2009). In addition, the stimulus substantially reduced funding spent on the environment compared to the prior year (Table 3; Batson, 2009). Remarkably, however, Chinese investment in renewable energy surpassed the United States in 2009 (Pew, 2010).

Table 3. Program components of China's stimulus bill. Source: Batson, 2009.

Components of stimulus (in billions of RMB)	November 2008	March 2009	Difference
Health care and education	40	150	+110
Technical upgrades and research and development	160	370	+210
Public housing	280	400	+120
Energy conservation and environment	350	210	-140
Rural Infrastructure	370	370	0
Post-earthquake reconstruction	1000	1000	0
Transport and power infrastructure	1800	1500	-300
Total	4000	4000	-

China has also been an enthusiastic participant in the CDM program. To date, China claims almost 60% of the total certified emissions reductions (CERs) generated from hydropower, wind power, and hydrofluorocarbon reduction projects (IGES, 2009; UNFCCC, 2010). However, the development of CDM projects in China has been marked by skepticism and scrutiny. Project developers are required to claim that a project represents additional emissions reductions that would not occur without CDM support, and a lack of verification leads to the potential production of illegitimate credits (He and Morse, 2010). Despite participation in CDM, China is likely to continue to prioritize its economic self-interest, and any reduction in greenhouse gas emissions may result from an increasing concern about domestic energy efficiency.

United States

Although no federal-level carbon dioxide emissions mandates exist yet within the United States, various states have elected to participate in state or regional-level emissions reduction initiatives. For example, California has mandated a state-wide emissions target of 1990 levels by 2020 for all major industries, and New York mandated a statewide emissions reduction of 10% by 2020, relative to 1990 levels. At the regional level, the Western Climate Initiative mandates emissions to be 15% below 2005 levels by 2020 in participating states, and the Regional Greenhouse Gas Initiative requires a 10% reduction in emissions by 2019 through a cap and trade program for emissions from power generation facilities. These decentralized actions can have a substantial impact on emissions reductions given the current lack of federal regulation (Lutsey and Sperling, 2008).

Proponents of international climate efforts, however, contend that federal-level action on a specific climate change bill by the United States is a crucial step towards forging an international agreement. To that end, on June 26, 2009, the United Stated House of Representatives passed the American Clean Energy and Security Act of 2009 (also known as the Waxman-Markey bill). This Act is comprehensive legislation that addresses all domestic aspects of global warming by employing a suite of regulations and market-based approaches to improve energy efficiency, implement a federal-level renewable portfolio standard, initiate a green jobs program, reduce economy-wide emissions through a cap and trade program, as well as various adaptation measures to mitigate the unavoidable effects of global warming.

Reaching successful federal climate legislation requires time in this complex democratic government system. A ruling by the Supreme Court in 2007 under Massachusetts et al. v. USEPA

(549 U.S. 497) gave the USEPA the authority to regulate carbon dioxide and other greenhouse gas emissions under the Clean Air Act. Pursuant to this ruling, the USEPA recently declared greenhouse gases as pollutants that endanger public health and welfare and set in motion a process for regulation through a command-and-control approach (Broder, 2009). The USEPA effort to cope with climate change in the event that Congress fails to pass climate legislation in the near-term represents the first time that carbon dioxide emissions will be regulated at the federal level in the United States.

Most recently, in the Senate, new bipartisan negotiations on a climate bill have been taken up by Senators John Kerry (D-MA), Lindsey Graham (R-SC), and Joe Lieberman (I-CT) in an effort to invigorate the Senate's stalled efforts on climate legislation and achieve President Obama's stated goal of comprehensive clean energy reform. Senators Kerry, Graham, and Lieberman released a "Framework for Climate Change and Energy Independence Legislation" in December 2009, which outlines some basic principles of what they hope Senate legislation would achieve, including similar emission reduction targets to those of the House-passed Waxman-Markey bill (Kerry et al., 2009). The details of the legislation that these Senators have been working on have yet to be released.

The United States' historical inaction on climate change has significantly dampened international climate efforts, however recent domestic actions suggest that the United States may be poised to reengage in international negotiations. As the world's second largest emitter of greenhouse gases, participation by the United States will be crucial under any international climate regime in order to achieve meaningful emissions reductions (e.g., B. McElmurray, personal communication, 16 February 2010). However, commitment from the United States is likely to require that a climate agreement extend regulations to other countries in order to ensure a level playing field for United States' business interests (Bang et al., 2007), which will be a key consideration in designing effective international policy architecture.

Bilateral Agreements

The United States and China have also developed a bilateral negotiating forum. The Strategic and Economic Dialogue (S&ED) provides an overarching coordinated venue for negotiations on various political and economic issues, with environmental issues addressed as a subset. The Dialogue, which has been completely reorganized under the Obama administration, is headed by the secretaries of State and Treasury for the United States and at the Vice Premier level in China, with Secretary of State Hillary Clinton currently responsible for energy, environment, and climate change negotiations. Since the Dialogue was established, it has become the primary vehicle for bilateral economic and energy discussions between the United States and China (Seligsohn et al., 2009). Secretary Clinton has elevated the issue of climate change and clean energy to one of the Dialogue's top priorities. During the first S&ED meeting under the Obama administration in July of 2009, Secretary Clinton expressed intent to form a meaningful clean energy partnership not only between the two governments, but also between the private sector and academic institutions of the United States and China. The United States-China Memorandum of Understanding to Enhance Cooperation on Climate Change, Energy, and the Environment was signed at the first meeting of the S&ED, which provides a framework for bilateral cooperation on climate issues.

In addition, in the months preceding COP 15, many informal partnerships between other countries arose to discuss emissions reduction goals. For example, in October 2009, India and China signed the Agreement on Cooperation on Addressing Climate Change between the Government of the Republic of India and the Government of the People's Republic of China, intending to strengthen bilateral dialogue and practical cooperation, recognize the priorities of adaptation and mitigation, enhance cooperation in adaptation, and establish a climate change working group. India and China have similar perspectives as nations' experiencing rapid economic development, growing populations and large natural resource endowments. In November 2009, Brazil and France agreed to a plan that calls

for reducing global carbon emissions to 50% of 1990 levels over the next 40 years. The alliance of Brazil and France is an example of the pairing of a developed nation with funds, advanced technology, and a need for carbon credits with a rapidly developing, resource-rich nation whose need for technological advancement and ability to provide CDM projects makes them a willing partner. Canada, the United States and Mexico released a joint statement declaring that these nations will work towards an agreement with a stated goal of not exceeding a 2^{o}C rise in global average temperature. These alliances all demonstrate that relationship building is a prerequisite to align international interests and develop accountability, and may be the key to setting realistic and attainable priorities at future UNFCCC meetings (J. P. da Rocha, personal communication, 22 March 2010).

An analysis of the complexities of the problem of climate change and the negotiations for a global emissions abatement agreement, as well as the successes of different scales of past global treaties, and the perspectives of major nations, has led to the following recommendations in *Section VII*. The UNFCCC is a forum that provides necessary legitimacy, because the adjustments that will need to be made globally in the effort to reduce greenhouse gas emissions will impact all areas of our social, economic, and political systems, and therefore agreement within the UNFCCC could provide the necessary stringency and cooperation in a global agreement. In addition, the UFCCC may also play an increasingly important role for emissions monitoring, reporting and verification in the future. However, the UNFCCC framework has historically been slow and has been unable to address the new geopolitical realities of climate negotiations in the wake of a global economic crisis. Therefore the following recommendations assume that immediate emissions reductions are the priority, and these recommendations may be achieved separately from the UNFCCC; the many complexities of equity, financing, technology transfer, and geopolitical dynamics, likely require that negotiations become based on specific components of the larger problem, in alternate forums.

VII. Recommendations

In considering both the near- and long-term future of international climate negotiations, three broad themes emerge:

1 **Focus on manageable goals by bringing together the relevant stakeholders who can move work on individual issues forward. In analyzing past global negotiation processes, such as those that developed the Montreal Protocol, working on manageable goals has led to more successful outcomes of both negotiations and treaties. Within the many issues that stem from climate change, it may be possible to come to an agreement on one sector or problem separately, rather than waiting for the sum of the negotiations to be resolved (La Vina, 2010; S. Barrett, personal communication, 18 February 2010; J.A. Ocampo, personal communication, 5 March 2010). Agreements of a smaller scale may also set a precedent for additional progress within the larger negotiations or within additional multilateral discussions (S. Barrett, personal communication, 18 February 2010).**

2 **A significant concern in advancing negotiations is the relationship between the United States and China. As the leaders of the developed and developing worlds, and as the two largest emitters of greenhouse gases, cohesion between these nations remains a critical challenge in negotiating a global treaty. Enhancing existing dialogues and promoting funding partnerships will likely advance global cooperation at climate negotiations, either within the UNFCCC meetings or in alternate discussions.**

3 **Financing mechanisms to engage the developing world and assist with mitigation goals and adaptation are important in a global agreement. In particular, mobilizing existing funding commitments will help to establish the legitimacy of long-term commitments.**

The following recommendations describe these key issue areas that should be addressed in the near future to substantially advance global progress. Rather than taking a linear approach, the most important near-term goals need to be prioritized and simultaneously addressed (LaVina, 2010); these recommendations are therefore divided into target areas for focus, outlining tangible actions that will contribute to the overall recommendation. These recommendations are made to advance the idea that near-term goals can be negotiated outside of the UNFCCC, which could stand alone successfully or later be incorporated into the UNFCCC process, and which may lay the foundation for broader agreement within any climate negotiations.

Recommendation: Focus on manageable goals with relevant stakeholders.

The many interacting issues and interests that are brought to UNFCCC negotiations challenge consensus and relationship building. LaVina (2010) has suggested that this may be the best time to rethink a comprehensive approach, and consider that individual issues and goals should not be held up by the inertia of COPs. Therefore, breaking up the larger problem of climate change into more manageable components will allow negotiations to engage smaller groups of players in issue-specific discussions, potentially in alternate forums, and will allow progress on issues where immediate action is achievable. REDD-Plus is an example of a manageable goal that is being negotiated as a separate issue, and CDM reform and technology agreements are additional goals that could be targeted.

Focus Area 1: With targeted reform, the CDM could provide an opportunity for significant near-term emissions reductions.

The effectiveness of the CDM as implemented after the Kyoto Protocol is difficult to gauge. By design, the CDM reduces emissions where it is most cost-effective while engaging developing countries in emissions reductions. However, critics believe that the program's bureaucracy and demand of profitability has lead to a slow process that misdirects project funding and does little in the way of transferring technology or promoting sustainable development (Olsen, 2007; S. Medina, personal communication, 4 March 2010; He and Morse, 2010). Perhaps most importantly, the delays currently inherent in the approval process discourage project investment and the overall potential success of the CDM.

In order to reform the CDM, the bureaucracy related to the administrative process needs to be addressed. Currently, the CDM is governed by an Executive Board comprised of COP delegates representing a changing group of Annex I and non-Annex I countries. The Board works with Designated National Authorities, and Designated Operational Entities, among other panels or groups, to evaluate CDM projects (Aalders, 2006). Establishing a permanent entity, with a dedicated budget and full-time staff, could greatly reduce the operational blockage that has stalled the success of the CDM (S. Medina, personal communication, 4 March 2010). Streamlining the CDM application process by focusing more resources would make the process more predictable and perhaps facilitate investment in CDM projects.

Further reform could be achieved through increasing the CDM's role as a method for facilitating participation. Historically, incorporating additional countries in the CDM has been difficult due to a lack of standardization. Using a benchmarking strategy in which a project's effectiveness is measured against past emissions of the particular sector that the project affects rather than the country in which the project is situated could lead to less ambiguous project evaluation (S. Medina, personal communication, 4 March 2010). In addition, creating an avenue for small-scale project developers to participate in the CDM would further the program's effectiveness. Small projects are kept out of the CDM process by high administrative costs, and aggregating small projects into one Project Design Document could allow these projects to be incorporated without burdening the CDM process (S. Medina, personal communication, 4 March 2010). Incorporating standards into the CDM would help to address many of these issues, and would ensure credibility for CERs from different countries.

Focus Area 2: Negotiating carbon capture and storage (CCS) and other technology agreements though venues such as the MEF could lead to more immediate emissions reductions.

Reaching agreements on carbon abatement technologies could lead to faster deployment and sharing of technology and speed emissions reductions. Furthermore, engaging nations in a tangible goal such as technology transfer may aid agreement within other negotiations. One major opportunity exists between the nations that are investing in research and development of CCS technologies, such as Canada, the European Union, Australia, and the United States (Canadian

Economic Action Plan, 2009; Forbes, 2009), and energy-intensive nations where the technology could be deployed, such as China and Brazil. For example, the United States and China share a need for CCS technologies given their abundance of coal (28% and 14% of world-wide recoverable reserves, respectively) and established networks of coal-fired electricity generators (United States Energy Information Administration, 2009), while nations such as Brazil generate significant emissions from oil and gas exploitation. With shared interests in climate change mitigation and a similar dependence on fossil fuels as an energy resource, these nations would mutually benefit from cooperating on CCS technology innovation and information sharing (Light and Hachigian, 2009).

This type of partnership is more likely to occur if countries have opportunities for candid dialogue in focused forums such as the MEF, as opposed to non-transparent organizations like the Asia-Pacific Partnership where some technology projects are currently housed (e.g., Peay, 2007). The participation of all MEF members in the final negotiations at COP 15 may demonstrate the advantages of the familiarity of those present at earlier MEF meetings, and these established relationships and shared technology goals could help to facilitate setting manageable technology goals that would result in real emissions reductions.

Exploring a CCS agreement in the MEF is an example of a manageable goal for which relevant stakeholders may be able to reach an agreement faster than through the UNFCCC process. Additional issues, such as black carbon pollution or the emission of individual greenhouse gases, could be approached in a similar manner (S. Barrett, personal communication, 18 February 2010).

Focus Area 3: Addressing specific trade issues such as IPR and carbon tariffs, through a venue such as the WTO, could aid with the development of a global agreement.

IPRs and carbon tariffs are two significant factors contributing to stalled climate change negotiations. Private firms utilize IPRs to protect research and development of technologies that require substantial capital investments from theft and copyright violations. Developing nations, without the financial resources to acquire such technologies, will utilize traditional emissions-intensive methods of development. With the potential of carbon tariffs, developing nations then face a two-fold problem that may further motivate non-participation in climate change agreements. In addition, potential tariffs in United States legislation may precipitate the international community to quickly make difficult decisions on the legality of carbon tariffs, though a consensus on the matter has still not been achieved. The UNEP-WTO joint report is a first step and provides detailed guidance, but it is not a continued, aggressive push to further advance technical advice.

For this reason in particular, the UNFCCC and WTO should be in deliberative consultation on issues such as IPRs and tariffs, perhaps through a new working group. The WTO has previously addressed contentious issues of IPRs and unequal access when disputes between pharmaceutical companies and developing nations were settled to provide affordable access to AIDS medication (Curti, 2001). Although the WTO is not without faults (e.g., developing nations have asserted that the WTO is unfairly skewed in favor of developed countries with the resources to maintain delegations at informal negotiations in Geneva), the structured framework of the dispute process of the WTO provides a coherent and consistent process for which trade disputes may be settled (Curti, 2001). Utilizing the WTO to reach agreements on IPR and carbon tariffs could effectively address trade issues that have held up climate change agreements, creating opportunities for progress in climate negotiations between developed and developing nations; in the short-term, a working group could address any disputes that may arise with impending carbon tariffs in legislation from the United States, and in the long-term, the group can make recommendations for issues such as climate change-related IPR.

Risks to these focus areas

Targeted negotiations for these manageable goals can, in general, proceed under a range of economic and political scenarios. For example, uncertainty about climate and energy legislation within the United States will not necessarily stall CDM reform or a technology agreement, as the United States could remain actively engaged in these issues without domestic legislation. However, involving only directly relevant stakeholders risks the instigation of conflict with parties not involved. For example, excluding some developing nations or representatives from the private sector may ultimately be counterproductive, as contention may transfer to other negotiations and worsen existing disagreements. Public perception and media attention on the negotiations of manageable goals may further such conflict if a lack of transparency is perceived due to the limited stakeholder involvement.

Issues of trade related to environmental legislation will ultimately change the competitive landscape of industries because of the possibility of carbon leakages. Without an equitable system, we run the risk of environmental protectionism from the developed countries that may be at the cost of emerging economies. As the issue of carbon tariffs escalates, this could deteriorate an already strained trade environment where pressures of protectionism have grown in the global recession (HSBC, 2009).

Recommendation: Focus on United States-China relations.

The relationship between the United States and China has historically been plagued by mutual distrust over each country's long-term intentions (Lieberthal and Sandalow, 2009), and thus there are various political obstacles that need to be overcome in order to foster cooperation. Emissions from the United States and China are the highest in the world, and thus cooperation is necessary for a global agreement, but is also important for national policies within each nation. Advancing domestic climate legislation within the United States is partially influenced by progress that the United States makes in getting China to contribute in reducing their share of global emissions. Similarly, comprehensive climate legislation in the United States could spur further advancements in China's climate change programs, in particular by driving important technological changes that China needs to make meaningful reductions (Seligsohn et al., 2009). Therefore, it is important that the United States and China find a way to work together to support domestic energy and climate initiatives as well as an effective international climate regime. The structures for collaboration are already in place, such as the Strategic and Economic Dialogue (S&ED). However, significant improvements to the negotiating process must be made in order to ensure an effective United States-China partnership.

Focus Area 1: Devoting resources to improving the United States-China S&ED could lead to increased global cooperation at climate negotiations.

The United States-China Memorandum of Understanding to Enhance Cooperation on Climate Change, Energy, and the Environment of the S&ED provides a framework for bilateral cooperation on climate issues and has raised environmental issues to higher levels of priority within each government (J. Clifford, personal communication, 12 March 2010). In order to use the potential in this existing dialogue to promote cooperation, joint research, development and deployment of clean energy technology could be a focus. Clean energy is a more politically attractive negotiating platform than climate change given that investing in clean energy is in the interest of both economies (Zhang, 2007; Lieberthal and Sandalow, 2009; Pew, 2009). Future negotiations, therefore, should be framed around this issue (Lieberthal and Sandalow, 2009).

Although the S&ED has gone under major restructuring under the Obama Administration, effectiveness in fostering a deeper engagement between the United States and China must be ensured. In meetings so far the S&ED has brought high-level officials to the negotiations. However, participation of key government agencies, academics, NGOs, and the private sector should be ensured. The S&ED must continue to bring the right players, such as technical experts from the Department of Energy, to the table to make real

progress on low-carbon growth strategies and other key climate change issues. Moreover, one of the most effective ways to influence China is to facilitate university and business partnerships because many recommendations for the country's Five-Year Plan are derived from these areas (Vandenbergh, 2008; J. Clifford, personal communication, 5 April 2010). Therefore, the S&ED should facilitate interaction between universities and business in both countries and involve key players in negotiations.

In addition, annual meetings may not be sufficient to productively enhance United States-China discussions given the extensive political and economic issues at stake between the two countries, and thus additional meetings should be held. The next meeting is scheduled to take place in late May 2010, which poses an opportunity to implement these proposed changes.

Focus Area 2: Utilizing negotiating bridge states like Mexico and South Korea could further United States-China negotiations.

There are currently more than sixty official United States-China bilateral dialogues and working groups, including the S&ED, the United States-China Senior Dialogue, and the Defense Policy Coordination Talks. The creation of more high-profile dialogues may only raise expectations and intensify the fundamental self-interest of each country (Economy and Segal, 2009). Partnerships require trust-building between countries, which is a challenging process that requires building coalitions, setting priorities, and using negotiators who are credible to all participating parties to aid the process (J. P. da Rocha, personal communication, 22 March 2010). Working within existing dialogues, key countries could be engaged as facilitators in advancing United States-China climate negotiations.

One potential strategy is to use a *pivot state*, a country that lies between China and the United States in terms of socio-economic development, and has principles and goals in common with both countries. Pivot states such as Mexico and South Korea may be able to fill the role of credible negotiators to facilitate discussions between the United States and China, and eventually other developed and developing countries (J. P. da Rocha, personal communication, 22 March 2010). While these smaller countries may not have a large impact on the issue itself through their ability to reduce emissions, they can make a difference in the negotiating process by applying pressure to influence negotiation outcomes (J.A. Ocampo, personal communication, 4 March 2010). Since Korea will be hosting the G-20 in 2010, and since Mexico will be hosting COP 16 as well as a number of preliminary talks, these countries could use their credibility and legitimacy to move talks forward, either within or outside of the UNFCCC.

South Korea

A possible pivot state between China and the United States is South Korea. South Korea's per capita GDP ($27,800) lies in between China ($6,700) and the United States ($46,000) (IMF, 2010). South Korea has a significant political and economic relationship with the United States, further strengthened by the drafting of the ROK-United States Free Trade Agreement (KORUS FTA) in 2007. The economic model of South Korea is closer to that of China, as they both rely heavily on exports and have a significant dependency on coal-fired energy. In addition, both nations have more aggressive plans to invest in clean energy technologies compared to the United States. Despite long-term political tension, these two nations have developed economic ties and have capitalized off of mutual investment opportunities. These economic ties and the destabilization of East Asia from North Korea have normalized their relations, and the two governments have been discussing possibilities of a free trade agreement via a strategic partnership. If South Korea eventually signed a trade agreement with China without ratification of the KORUS FTA, the United States would be at a significant disadvantage vis-à-vis an ever-growing China; American firms facing the current Chinese 9% tariff could potentially lose over one trillion dollars to a tariff-free Korea (Feigenbaum and Manning, 2009). Therefore, the economic ties between these nations are significant, and could be leveraged in climate negotiations.

Mexico

Mexico is another country that can take on a

pivotal role as an intermediary negotiator between China and the United States. Mexico's GDP per capita, at $13,500 (IMF, 2010), is lower than South Korea's but double that of China. Mexico's trade policy is also among the most open in the world with eleven trade agreements with forty one countries; for example, Mexico is party to the North American Free Trade Agreement, which eliminated trade and investment barriers with the United States and Canada. In addition, China is now Mexico's second largest trading partner, second only to the United States (Villarreal, 2009). While Mexico and China do not have legal trade agreements beyond a strategic dialogue, more cooperation between the two nations could potentially improve United States-China discussions.

More generally, the role of these pivot states could be crucial for climate negotiations. Straddling the line between the North and South, Mexico and South Korea are both part of the non-Annex I group of developing countries but are also leading members of the OECD and G-20 (Stavins, 2010). Thus, they could be among few countries that could use pressure to move UNFCCC negotiations through the current deadlock. Multiple additional nations have characteristics that could be useful in facilitating negotiations between the United States and China (see Table 4).

Table 4. Potential pivot states for negotiations between the United States and China. Sources: IMF, 2010; IEA, 2009.

	Emissions per capita (tons)	GDP per capita ($)	Climate Commitments	Role as Pivot State
South Korea	10.9	27,800	30% reduction In GHG emissions below BAU by 2020	Host country of G20 summit in November 2010. Close political and economic relations with both China and US. US and South Korea are trying to push through a free trade agreement (KORUS-FTA). S Korea, China and Japan currently in talks for a regional free trade agreement.
Mexico	4.14	13,500	30% reduction In GHG emissions below BAU by 2020	Host country of COP16 in December 2010. Significant economic ties with United States and China. Free trade agreement with the US established through NAFTA (1992).
Vietnam	1.1	2,900	Domestic adoption National Target Programme for Climate Change to address issues of mitigation and adaptation	ASEAN-China Free Trade Agreement of 2009 and recent approval of a new cross border economic zone are expected to significantly increase trade flows and political relations between Vietnam and China. U.S. proposal of enhanced cooperation with the Greater Mekong Sub-Regions (GMS) to tackle issues specifically related to climate change.
South Africa	7.27	9,900	34% reduction in emissions below BAU in 2020	Africa-China-U.S. trilateral dialogue to discuss private sector involvement for socio-economic development in Africa.
Australia	18.75	37,300	25% reduction in emissions below 2000 levels in 2020	Fossil fuel dependent economy may serve as a model of continuous economic growth in tandem with aggressive emissions abatement policies.
United States	19.1	46,400	17% below 2005 in 2020	
China	4.57	6,500	Cut emission intensity by 40% to 45% from 2005 to 2020	

** United States and China shown for comparison.*

Risks to these focus areas

As the role of China in the global economy becomes increasingly more important, bilateral climate change cooperation between the United States and China could be stalled by a growing number of other issues. For example, the recent allegations of Chinese currency manipulation, disagreements over Iran's nuclear program, and an increasingly public feud about Chinese policies towards United States and other Western companies have all added to growing tensions between the two countries.

In addition, placing too much emphasis on the S&ED may increase the risk of sending the wrong signal to other countries. More specifically, Japan and India are wary of a strategic partnership between the United States and China. Cooperation on climate change by these countries will be important in the future, given the large share of global emissions that they are responsible for, and exclusive bilateral talks without proper transparency may evoke protectionism and trade disputes.

Furthermore, if there is a complete lack of energy or climate domestic legislation in the United States, this could overwhelm all attempts to stimulate United States-China cooperation on issues related to climate change. China is currently the leader in stimulus towards clean technologies, investing $87 billion USD in 2010 and accounting for 38% of all similar funding (HSBC, 2010). Thus, China has stated that without strong domestic policy from the United States, their policy initiatives will not go beyond their current voluntary commitment of intensity-based emissions reductions. However, if the United States enacts legislation that contains an emissions cap, the dialogue between the two nations will be enhanced. Firm commitment from the United States can be used as negotiating leverage to persuade China to implement a more aggressive emissions-intensity goal, or to push China to determine a peak emissions target. If, alternatively, the United States enacts legislation focused on energy, without an emissions cap, leverage for negotiations with China is weakened. Though it has been shown that an energy bill, in combination with existing state-level initiatives, could substantially reduce emissions in the United States (e.g., a 14% emissions reduction below 2005 levels by 2020; HSBC, 2009), a firm emissions cap is likely the most effective persuasion the United States could use to advance China's emissions reduction commitment.

Recommendation: Focus on legitimizing funding commitments.

Central to climate negotiations are the issues surrounding financing mechanisms. While pledges of $30 billion over the 2010-12 period were made by the United States, the European Union, and Japan for climate change adaptation in developing countries, no disbursements have been made to date. Prior to COP 16, if the first installments of funding commitments from developed countries were distributed or at least shown to be available for disbursement, this would increase the credibility of these types of pledges and could ease future negotiations between developed and developing nations. Thus, in order to reaffirm legitimacy there is immediate need for collecting this fast start funding for the 2010-2012 period and creating a solidified process for developing countries to apply for aid.

Focus Area 1: Making fast-start funding available will increase the credibility of all funding commitments.

To show that developed nations are truly committed to providing aid to developing countries, it is important to facilitate the implementation of funding agreements; the amount of funding is less important in demonstrating legitimacy than actually moving forward with action. To avoid competition with private sector investments, these funds should be disbursed through profitable investments and/or through guarantees or subordinated debt to account for the risk premium of climate change investments (Project-catalyst, 2009). Given the current urgency, every available method of financing should be used including bilateral partnerships, national trust funds (e.g., Amazon Fund), Multinational Development Banks (e.g., World Bank, International Finance Corporation), and other existing global funds such as the Global Environmental Facility and the Adaptation Fund

(Project-catalyst, 2009). In addition, as funding is mobilized, a mechanism of monitoring and verification will need to be established to monitor the flow of funds by an independent body such as the Bank of International Settlement. This is particularly important for developing countries that do not have the capacity to monitor emissions reductions, as the flow of funding can be used as a coarse approximation for compliance.

Focus Area 2: Using public funds to bring in private sector investment could bolster funding mobilization.

Given the difficult state of the current global economy, negotiators are now looking seriously at the private sector for sources of additional funding. Two current methods can be used for public funds to promote private sector investment: front-loading public funds and public sector credit guarantees, equity, and insurance structures. Front-loading public funds is a method that has been used successfully in the past. For example, in the public health sector, the International Finance Facility for Immunization (IFFIM) has received commitments of $5 billion USD over twenty years from government organizations to increase vaccination in developing countries. The IFFIM used this as collateral to then raise immunization bonds, which in turn accelerated the rate of vaccination. A similar method could be used raise global carbon bonds backed by government funds (HSBC, 2009). Also, public sector credit guarantees, equity, and insurance structures can be used to leverage up to twenty times the initial funds (UNEP, 2008). There have also recently been plans proposed as to how developed countries can raise funds; the pros and cons of these methods are shown in Table 5, with assigned amount units being the strongest and the World Bank Pilot Program being the weakest.

Risks to these focus areas

Funding prospects will certainly be affected by the current economic recession and uncertainty in fiscal stability for many years to come. At less than 10% of the stimulus that has been committed by government domestic actions, the fast-start funding is relatively small (HSBC, 2009). However, there is risk that fast-start funding may become secondary to domestic use as issues of energy security and domestic job growth become national priorities. In addition, even as these funds are raised and become available, there still remains the politically divided question of how the funds will be allocated, governed, and monitored to ultimately create scalability and credibility in terms of real emissions reductions and adaptation.

Table 5. Potential options for financing mechanisms to transfer funds to developing countries. The rating for each category ranges from 0 to 1, with 1 being the highest. The totals indicate the most effective methods. Source: Stamp Out Poverty (2009).

OPTIONS	DESCRIPTION	ABBREVIATION	SUFFICIENCY	PREDICTABILITY	EQUITY	ADDITIONALITY	VERIFIABILITY	TOTAL
Norwegian Assigned Amount Units (AAU)	International auctioning of domestic carbon emission permits	AAU	0.5	1	1	1	1	4.5
International Air Passenger Adaptation Levy (IAPAL)	International air travel levy	IAPAL	0.5	1	1	1	1	4.5
International Maritime Emission Reduction Scheme (IMERS)	International shipping levy	IMERS	0.5	1	1	1	1	4.5
G-77 + China	Developed countries to contribute 0.5% of GDP towards climate mitigation fund	G-77	1	0.5	1	1	0.5	4
Tuvalu Burden Sharing Mechanism	Air travel and freight shipping levy	TBSM	0	1	1	1	1	4
Currency Transaction Tax	International currency transactions levy	CTT	0.5	0.5	1	1	0.5	3.5
The Mexican Climate Change Fund	Participating countries to contribute funds dependent on emissions, population, and gross domestic product	MCCF	1	0.5	1	0.5	0.5	3.5
Swiss Carbon Tax	Global tax on carbon emissions with per capita exemption	Swiss	0.5	0.5	0.5	1	0.5	3
EU Emission Trading Scheme (ETS) Auction Levy	EU Emission Trading Scheme (ETS) auction levy	ETS	0.5	0.5	0.5	1	0.5	3
US Auction Tax	US auction tax	US	0.5	0.5	0.5	1	0.5	3
Global Capital Fund Mechanism	Bond issuance on international capital markets	GCFM	0	0.5	0	1	0.5	2
World Bank Pilot Programme for Climate Resilience	Discretionary loans for adaptation provided by developed countries via the World Bank	PPCR	0	0	0	0	0.5	0.5

VIII. Conclusions

The science of climate change is increasingly suggesting that immediate reductions in global greenhouse gas emissions are necessary to reduce some of the most serious environmental consequences of rising average global temperatures. The results of this research indicate that the focus of near-term climate negotiations should aim to engage specific emissions reductions opportunities. Environmental Defense Fund requested that we consider potential alternate forums for negotiating a climate agreement, with the goal of identifying opportunities for reducing emissions in the near future.

Reaching global consensus at large-scale negotiations has historically been slow, in environmental and other issue areas, and many believe that a global approach to climate negotiations may need to be reconsidered. Past negotiations have provided valuable lessons that can be applied when considering a new path forward for climate negotiations. The recommended focus areas in this report demonstrate that directing resources towards issue-specific, achievable goals in appropriate forums, and with key stakeholders, increases the likelihood of success within individual issue areas and also potentially within larger multilateral or global climate negotiations. This report has presented a range of issue-specific goals that should be considered as we move forward with climate negotiations.

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Appendix 1: Annotation of Selected References

Ahuja D. and Srinivasan, J. (2009). Why controlling climate change is harder than stopping stratospheric ozone depletion. *Current Science,* 97(11): 1531-1534.

- In attempting to understand why climate change negotiations have yielded no significant results to produce a comprehensive and binding agreement, comparisons to the successful Montreal Protocol are common. However, this article asserts that there were many specific factors that led to the Montreal Protocol's successful phase out of CFCs that are not applicable to carbon emissions, including the scale of the problem itself, the number of nations involved in negotiations, and the support of the United States.

Alter, K and Meunier, S. (2009). The Politics of International Regime Complexity Symposium. *Perspectives on Politics,* 7(1): 13-24.

- This symposium examines the relation of "international regime complexity" and geopolitics. These authors describe the analytical insights that can be gained by thinking about any single agreement as being embedded in a larger context of international rules and regimes. The first two essays define international regime complexity and identify the mechanisms through which it may influence the politics of international co-operation. Other authors' contributions analyze how international regime complexity affects politics in specific issue areas: trade, linkages between human rights and trade, intellectual property, security politics and others. The paper concludes by arguing that international regime complexity may benefit powerful actors more than others.

Bodansky, D., Chou, So. Jorge-Tresolini, C. (2004). International Climate Efforts Beyond 2012: A Survey of Approaches. Pew Center on Global Climate Change.

- This report surveys the range of alternative options for advancing international climate change negotiations post-2010. The survey provides an overview of over 40 different proposals for accomplishing this, while recognizing that advancing international climate efforts comes against a backdrop of the UNFCCC. Policy proposals outlined here vary significantly – for instance, some build on the architecture of the Kyoto Protocol, while others depart from the existing architecture (for instance, by proposing a different negotiating process or a different forum). The report does not favor one proposal over the others, but rather establishes a set of criteria that can be used in assessing the alternative approaches.

Carnahan, K., ed. (2008). Greenhouse Gas Market Report 2008: Piecing Together a Comprehensive International Agreement for a Truly Global Carbon Market. International Emissions Trading Association.

- This report by the International Emissions Trading Association provides a broad overview of the current state of global carbon markets, highlighting the EU ETS and country-level market initiatives and various issues surrounding these policies. The report notes that the sum of existing carbon markets may not achieve necessary emissions reductions. The authors suggest that markets need to be better linked and also engage a broad range of sectors and countries. Namely, any international framework should aim to facilitate the linkages of existing markets, however this is complicated by the complexity of existing markets.

Copenhagen Economics and the IPR Company. (2009). Are IPR a barrier to the transfer of climate change technology? Copenhagen, Demark.

- This paper examines the validity of the common claim that intellectual property rights on carbon

abatement technology is a major barrier to developing countries' carbon abatement efforts. The paper describes the distribution of patents geographically by country of residence of the patent holder, and shows that the gap in patents held between developed and developing nations is decreasing. Some of the major conclusions include that the prices of technologies are not necessarily higher for technologies covered by an IPR, and that no one nation controls the market for carbon abatement technology.

Drexhage, J. (2009). Copenhagen: A Memorable Time for all the Wrong Reasons? *International Institute for Sustainable Development Commentary.* Ottawa, Canada.

- This analysis by the Director of the International Institute for Sustainable Development's Climate Change and Energy Program was written immediately after COP 15. The report covers problems with the UNFCCC process, including consensus and transparency, Unites States- China relations, and possible positive outcomes of the Copenhagen Accord, such as tentatively bring non-Annex I parties into the "mitigation tent."

Gallagher, K. S. (2007). China Needs Help with Climate Change. Retrieved 19 April 2010 from belfercenter.ksg.harvard.edu/files/Gallagher-Current%20History.pdf.

- This report articulates China's need for institutions, policies, and enforcement mechanisms that can foster technology transfer and environmental protection. Recommendations are made as to how the United States and China can collaborate to meet climate challenges on climate, particularly through technology partnerships to enable China to “leapfrog” emissions-intensive development.

Gordon, K., Wong, J. L., and McClain, J. T. (2010). Out of the Running? Center for American Progress. Retrieved 17 April 2010 from www.americanprogress.org/issues/2010/03/out_of_running.html.

- This report contains timely information and analysis about the need for the United States to increase spending on clean energy technology in the face of Chinese, German and Spanish advancement in this area. The report was compiled by Julian Wong, author of a respected blog (http://greenleapforward.com/) that provides in-depth analysis about Chinese renewable energy advancements. This report argues that the United States has a clear moral imperative to join the worldwide effort to reverse climate change as well as an urgent economic imperative to become a leader in clean energy.

He, G., and Morse, R. (2010). Making carbon offsets work in the developing world: Lessons from the Chinese wind controversy. Stanford University. Retrieved 17 April 2010 from <http://fsi.stanford.edu/publications/making_carbon_offsets_work_in_the_developing_world_lessons_from_the_chinese_wind_controversy/>.

- This report provides analysis of the Chinese windfarm controversy that emerged in the days before COP 15 as well as problems in the greater CDM system, and draws implications for the design of effective global carbon offset policy. The authors argue for CDM reform, including short- and longer-term mechanisms that are "agnostic to market structure and independent of domestic regulators," a current fault of the CDM program in countries like China.

Heal, J. (2009). The economics of climate change: a post-Stern perspective. *Climactic Change*, 96: 275-297.

- This author conducts an analysis of climate change economics after the seminal Stern Report and describes how various uncertainties have influenced climate change politics and policies. The author asserts that more recent literature conducting an analysis of the arguments of the Stern Report yields a call for stronger carbon mitigation efforts that is informed by progress in climate change economics.

Helm, D. (2008). Climate-change policy: why has so little been achieved? *Oxford Review of Economic Policy,* 24(2): 211-238

- Through an analysis of the Kyoto Protocol, this author asserts that the failure of current international climate change policies to significantly reduce carbon emissions is a function of placing an emphasis on carbon production and not carbon consumption. With economic models attempting to forecast the cost-efficiency of climate change mitigation to legitimize policy action, oversight of carbon consumption and underlying issues of development and trade are key reasons for climate change policy stagnation.

Heller, T.C. and Shukla P.R. (2003). Development and Climate: Engaging Developing Countries. Pew Center on Global Climate Change.

- This paper examines the opportunities and challenges for devising and implementing effective strategies for mitigation and adaptation for developing countries. The authors outline various methodologies for financing and regime architectures that integrate climate and development objectives.

Huang, J. (2009). A Leadership of Twenty (L20) Within the UNFCCC: Establishing a Legitimate and Effective Regime to Improve Our Climate System. *Global Governance: Review of Multilateralism and International Organizations*, *15*(4): 435-441.

- The author reviews the issues that divide the North and South in relation to climate change. Developing countries believe that the developed countries must bear most of the costs of climate change, as they are responsible for most of the emissions. Several developed countries, in particular Japan and the EU, assert that they have worked to reduce emissions, particularly through improved energy efficiency. As emerging economies like China and India take the lead in emissions, developed countries are pushing them to become responsible stakeholders in climate change efforts. In addition, although groupings like the G-20 and MEF have made climate change a top priority, and may be a useful model, they do not have the required legitimacy as compared to the UNFCCC, and are not likely to produce environmental regimes. This author proposes an alternate negotiating strategy, the L20 (leadership of 20), which is comprised of major powers within the UNFCCC that would be chosen to adequately represent both developed and developing countries; the L20 could build on the long history of the UNFCCC and maximize global participation.

Initiative for U.S.-China Cooperation on Energy and Climate. (2009). A Roadmap for U.S.-China Cooperation on Energy and Climate Change. Retrieved 17 April 2010 from http://www.pewclimate.org/US-China.

- In conjunction with the 2009 Brookings Institution report *Overcoming Obstacles to U.S.-China Cooperation on Climate Change* (see Lieberthal and Sandalow, 2009), the two publications provide analysis detailing the need for increased China-United States cooperation in the environmental arena. Taken together, the publications, each co-written by high-level China scholars such as Stephen Chu and the former COO of Goldman Sachs, provide roadmaps for improving bilateral relations between the U.S. and China.

Keohane, R.O. and Victor, D. (2010). *The Regime Complex for Climate Change*. Discussion Paper 10-33, Harvard Project on International Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School.

- This paper examines the climate change regime complex by establishing a continuum: one extreme being a comprehensive legal framework and the other being a fragmented issue-oriented approach. This paper, organized into three parts, gives a description of the institutional components that make up the climate change regime complex, discusses the evolution of these components, and explores how to ensure that this complex is effective at successfully implementing a global agreement. The authors conclude that a flexible and adaptable regime complex is necessary for success, but this regime must be integrated into comprehensive legal framework, and thus should fall within the mid-range of the continuum. This perspective is illustrated through examples of emissions trading, best practices in land use, and technology policy.

Lessmann, K., Marschinski, R. and Edenhofer, O. (2009). The Effects of Tariffs on Coalition Formation in a Dynamic Global Warming Game. *Economic Modelling*, 26:641-649.

- These authors create a dynamic global warming game that show the effects of tariffs and other trade measures used by members of a hypothetical international environmental agreement (IEA) that could potentially be used to sanction states non-member states. The authors solve the model numerically and find that there is a potential to increase participation in the IEA, even when goods from other competitor countries are nearly perfect substitutes. The authors also analyze the effect of trade sanctions on global welfare, environmental effectiveness, and the credibility of the tariff mechanism.

Lieberthal, K. and Sandalow, D. 2009. Overcoming Obstacles to U.S.-China Cooperation on Climate Change. The John. L. Thornton China Center at Brookings. John L. Thornton China Center Monograph Series, Number 1.

- This report by the Brookings Institute recommends ways to overcome obstacles to United States-China cooperation on climate change issues. The report is aimed at developing avenues of bilateral cooperation between the two countries in an effort to facilitate a multilateral climate agreement. The report notes that opportunities for collaboration between the two nations are vast, however this will require high-level support, which will be difficult given the cultural differences and mutual suspicion that currently exist. The recommendations put forth in the report are based on the principle that cooperation will only exist if it serves the interests of both sides. The recommendations include acknowledging the legitimacy of each other's perspective, building a clean energy framework for cooperation, emphasizing co-development of technology, and using and improving existing structures for cooperation.

Light, A., and Hechigian, N. (2009). Rise of The Green Dragon? *Center for American Progress.* Retrieved 3 March 2010, from http://www.americanprogress.org/issues/2009/04/rise_green_dragon.html.

- This article discusses the events that took place leading up to COP 15. The authors discuss the motivations of certain parties (U.S. – China, for instance) and make recommendations for how these parties can negotiate effectively outside of the UNFCCC process (e.g., within the MEF). For example, leveraging shared interests, such as coal as an energy source, through the MED cold lead to mutually beneficial action.

Lövbrand, E., Rindefjäll, T., and Nordqvist, J. (2009). Closing the legitimacy gap in global environmental governance? Lessons from the emerging CDM market. *Global Environmental Politics*, 9(2): 74-100.

- An analysis of the CDM, these authors assert that current carbon emissions abatement regimes approach efficiency and legitimacy with a mutual exclusivity where correction may yield opportunities for improvement. Utilizing CDM as an example of a public and private institutional collaboration, these authors find that cost effective emissions reductions and sustainable development in project host countries do not go "hand-in-hand" and can detract from more local and effective mitigation projects. However, the integration of private and public entities that participate in CDM point to new directions for environmental governance regimes that may lead to more efficient and equitable carbon abatement mechanisms.

Macintosh, A. (2010). Keeping warming within the 2 degree C limit after Copenhagen. *Energy Policy*, *38*: 2964-2975.

- This paper describes 45 scenarios for carbon dioxide emissions to demonstrate what would be necessary to keep within the stated 2 degree goal of the Copenhagen Accord. The paper converts the pledges made by developed countries to carbon dioxide equivalents. The Author argues that the climate negotiations in 2010 may be the last chance to put mitigation strategies in place that will keep the temperature increase below 2 degrees.

Marcellino,D., and Gerstetter, C. (2010). Technology Transfer in the International Climate Negotiations: Assessment of Proposals and Discussion of Open Questions. *Carbon & Climate Law Review, in press*.

- This report discusses technology transfer issues in climate change negotiations. Specifically, the report outlines conclusions concerning funding technology transfer, uses for the CDM pending certain reforms, and the need to utilize performance indicators for technology transfer compliance purposes. The report suggests that the disagreement regarding technology transfer might be larger than the issue's importance requires. The report also suggests that the UNFCCC is an important institution, but is only one part of a multifaceted approach to approaching the technology transfer issue.

Michonski, K. and Levi, M. (2010). Harnessing International Institutions to Address Climate Change . New York: Council on Foreign Relations.

- This article examines existing institutions and climate change efforts and capabilities, as well as the future potential of a variety of international institutions. The authors argue that there is significant existing institutional capacity to draw from in addressing climate change, and conclude by describing how international institutions have a significant role to play in mitigating and adapting to the effects of climate change.

Moor, M. (2003). Multilateral Meltdown, *Foreign Policy*, 135: 74-75. Retrieved 14 February 2010, from http://www.jstor.org/stable/3183596.

- This author served the WTO as Director General from 1999 to 2002, and was the prime minister of New Zealand in 1990. This article offers reasoning for why multilateral institutions are due for redesign. The author suggests that a summit similar to the 1944 meeting of world leaders in Bretton Woods, NH, is needed, in which a small group of leaders convenes to reform global governance without slowing down "the process in the name of consensus."

Murphy, D., Drexhage, J., Tirpak, D., and Gass, P. (2009). Financing for Developing Countries. *Policy Dialogue with Civil Society on the UNFCCC Negotiations.* Calgary, Alberta: International Institute for Sustainable Development.

- This paper reviews the need for financing developing countries and estimates of funding needs, and then examines possible funding mechanisms and governing structures. The paper addresses how an agreement can account for the strong linkages between climate change and traditional development activities, and how the incremental costs associated with climate change activities can be distinguished from development efforts. The options analyzed include Mexico's proposed Green Fund, G-77/China's proposal for defined budgetary contributions, and auction permit mechanisms. Pending questions that remain after analysis include the options that exist to fill the anticipated gap in funding for developing country actions, how the funds should be used and if there should be a differentiation in access to funds among developing countries.

Price, L., Wang, X., and Yun, J. (2008). China's Top-1000 Energy-Consuming Enterprises Program: Reducing Energy Consumption of the 1000 Largest Industrial Enterprises in China. Retreived 19 April 2010, from ies.lbl.gov/iespubs/LBNL-519E.pdf.

- This paper is written by a collaboration of government, business, and research that grew out of a United States-China partnership, domestically based at the Lawrence Berkeley National Laboratory. The paper makes policy and technology recommendations for reducing greenhouse gas emissions by top emitters within China.

Seligsohn, D., Heilmayr, R., Tan, X., and Weischer, L. (2009). WRI Policy Brief: China, the United States, and the Climate Challenge. World Resources Institute.

- This issue brief discusses successes and obstacles to effective climate regulation in China, and addresses competitiveness concerns in relation to a federal cap and trade policy in the United States. Recognizing

that the United States and China must work together to support effective domestic energy and climate programs, as well as an international climate regime, the report details specific opportunities for improving climate change cooperation between the two countries. A major finding of the report is that comprehensive climate legislation in the United States could facilitate improvements in China's climate change programs. The report also highlights the Strategic & Economic Dialogue as a potential venue for enhanced cooperation.

Veel, P.E. (2009). Carbon Tariffs and the WTO: An Evaluation of Feasible Policies. *Journal of International Economic Law,* 12(3):749-800

- This author discusses the legality and political feasibility of carbon tariffs that could be designed by both the United States and the European Union. The paper specifically focuses on the policies within the 2007 *Lieberman-Warner Bill*. No specific recommendation is made about how or whether to enact carbon tariffs; the author instead describes that a multilateral approach should be a first-best decision, and considers the feasibility (both legally and politically) of this approach.

Velders, G.J.M, Andersen, S.O., Daniel, J.S., Fahey, D.W and McFarland, M. (2007). The Importance of the Montreal Protocol in Protecting Climate. *Proceedings of the National Academy of Sciences,* 104(12): 4814-19.

- This article explains how the Montreal Protocol has helped both to reduce global warming and to protect the ozone layer, and addresses the benefits to climate change achieved by the Montreal Protocol alone. The paper concludes by explaining why the effects of the Montreal Protocol on climate are becoming smaller through time.

Victor, D. (2010). Global Warming Policy After Copenhagen. *Willard D. Cochrane Lecture in Public Policy.* Minneapolis and St. Paul: University of Minnesota.

- In this public lecture, David Victor opines about the outcome of COP 15. Victor first discusses the mismatch between the structure of the global warming problem and the UNFCCC as a forum for solving the problem: only six emitters matter, the central problem for global warming policy is interdependence, national interests vary and thus require specific incentivization, and most diplomacy has focused on emissions targets that governments do not control. Victor then discusses that there is a need for clear leadership to emerge, but while China's importance is rising, its international leadership is not. Victor proposes a GATT-like club to first come to an agreement, and predicts that United States' legislation will not likely pass in the near-term, but will rather take the form of a fragmented set of policies and markets.

Wara, M and Victor, D. (2008). A Realistic Policy on International Carbon Offsets. Working Paper 74: Program on Energy and Sustainable Development, Stanford University.

- This article reviews the CDM market history and finds an urgent need for reform. The authors argue that the United Stated should not rely on offsets to provide a reliable ceiling on compliance costs and explain how more explicit cost control mechanisms, such as safety valves, would be much more effective.

Zhang, Z. (2007). China, the United States and technology cooperation on climate control. *Environmental Science & Policy,* 10: 622-628.

- This paper argues that although the involvement of both the United States and China is crucial in moving international climate negotiations forward, the proposal for joint accession by both countries will not accomplish this, primarily due to the fact that such a proposal is only in the interest of the United States. Further, the two countries are unlikely to agree to emissions caps under an international regime given the political environment in the United States and China's concern with economic growth. The author suggests that the best way to facilitate cooperation between the two countries is through research, development, and deployment of clean technologies, which is in the best interest of both countries. The author suggests that the Asia Pacific Partnership for Clean Development and Climate may be a suitable

venue for technology cooperation between the United States and China, while technology is only part of the solution and a coordinated policy framework (such as the UNFCCC or a follow-up international regime) is the only way to effectively address global climate change.

Zhang, Z. (2009). Multilateral Trade Measures in a Post-2012 Climate Change Regime? What Can Be Taken From the Montreal Protocol and the WTO? *Energy Policy*, 37: 5105-5112.

- This paper discusses the use of trade-related measures in the context of climate negotiations to develop a post-Kyoto protocol agreement. Focusing on parallels between current negotiations and successful aspects of negotiations leading to the Montreal Protocol, the author makes recommendations for funding mitigation and adaptation initiatives in developing countries. Further, the author examines the Lieberman-Warner bill introduced in the U.S. Senate and finds that the bill is inconsistent with WTO principles and generally ineffective. The primary finding of the article is that developed countries should use positive incentives to encourage developing countries to take greater actions in addressing climate change.

Appendix 2: Interview Notes

These interview notes are based on informal conversations with selected interviewees, and should be considered only in that context.

1. Scott Barrett – Columbia University School of International and Public Affairs; The Earth Institute
The United States has an important part to play in helping negotiate China's emissions goals, and could offer payments in exchange for curbing emissions. If the United States can get China to move in sync with what the former decides, everyone else will move in step. If US negotiators go to China and convey the message that they understand that the United States has a historic responsibility to curb emissions, the Chinese are much more likely to agree to a deal.

With regards to Copenhagen, President Obama couldn't promise an emissions cut without having passed domestic legislation; domestic policy cannot overstep the pace of international negotiations. A good international treaty will only ask countries to do what can be met by domestic legislation. After Copenhagen, analysts concluded the problem was the process, but this is not the case; once there is significant will, the process will find a way to work itself out. Also, the call for unanimity is unrealistic; consensus is more likely.

Environmental organizations are asking for too much. Environmental advocates could have limited hydrofluorocarbons (HFCs) at Copenhagen, for example. Nothing in international law happens at once; progress needs to happen in iterations, one component at a time. Climate negotiators can gain momentum by building smaller agreements around subjects such as HFCs, carbon capture and sequestration, etc. Moreover, HFCs could be limited based on the Montreal Protocol today, and dissidents would not object. Such an agreement would set a precedent for other agreements of regulating one gas at a time, or one sector at a time. Alternatively, we could have had an agreement on carbon capture and storage, based on what we see in the Carbon Sequestration Leadership Forum. Initiatives like that show that there is a will, and an agreement could happen on that particular issue.

At this point, everyone should have one eye on negotiations and one eye on alternative technologies and methods. For instance, carbon capture and sequestration would be a great start. Geo-engineering could be done unilaterally. Environmental organizations should focus on supporting research on technological solutions to global warming. In addition, while many are attached to market mechanisms, they should be a means to an end: if they work, they should be used, but if they do not, do not use them. For instance, caps are not solutions; not a single country has an economy-wide cap. Even Waxman-Markey only covers 85% of the economy.

2. Eron Bloomgarden – ***President of Environmental Markets, Equator, LLC***
A successful carbon market requires policy. Without policy there is no carbon market or price on carbon. There are two ways that international carbon markets happen: through an integrated international framework approach with caps and timelines, or a more piecemeal approach in which countries, regions, states, or other organized jurisdictions create their own markets that may be linked. Clearly, that's a suboptimal scenario for most investors and for companies who are facing compliance in multiple jurisdictions, as it creates additional expense and confusion. But that is where we are right now: Europe and Australia are doing their own thing, and certainly some states and regions in the United States are doing the same. In terms of a global carbon market, the question remains: can we first get a globally binding agreement in Mexico City or after (sometime before 2012), or, if not, do we have regional activities that can somehow link?

There is not one market now, there are many different markets and even within those markets there are

different commodities. As an example, Europe has EUAs and CERs, which have different prices and follow different forward price curves; although they are related and linked they have their own drivers. These different instruments will respond differently depending on their exposure to the policy uncertainty. For example, how much is the price supported by speculative buyers who are using that as an investment to have some exposure to policy? A good example of this would be RGGI – there are clearly compliance buyers in the market but the price was supported by early actors who were using is as a proxy for federal compliance, so that is why the price is softening now. Depending on how exposed to policy the instrument is, the general rule is negative/downward price pressure as you have increasing policy uncertainty.

The private sector has two options for climate change mitigation or adaption strategies. The first may lead to a legislative and regulatory process that results in a price on carbon fundamental in the green economy; you see that happening with a possible cap in the United States. The other option at this stage is to start aggregating supply for carbon credits. Offset projects, for example, may not always germinate, but if you want to create real action and get the project started quickly you need some supply, and I think the private sector can provide that. Investing in the development of supply is one of the private sector's main roles. When the carbon market is fully working, the private sector would do what it does best, which is provide capital and find efficiencies for the market. However, the private sector role depends strictly on policy decisions. *Among the available climate change mitigation mechanisms, the private sector* overwhelmingly supports cap and trade. There are not necessarily winners with a tax or command and control. However, cap and trade provides incentives for innovation and sort of leadership in the private sector. Think about this: when you put a price of carbon, your utility would set bigger targets. The private sector looks at cap and trade in the United States as the best example.

3. Steven Cohen – Columbia University School of International and Public Affairs; The Earth Institute
The developing world has no regulation because it is not in their interest until the technology is present to allow development with low carbon output. China in this generation and Africa in the next generation will need new technologies fast. Older equipment is cheaper for them to use. The United States needs to subsidize skipping this stage of economic development. All the reductions we do domestically will be matched by increases in the developing world, and therefore it is not a carbon regime to limit carbon dioxide we should be after as much as a renewable energy and energy efficiency technology transfer mechanism. The key is getting money and technology to the developing world. Making that $100 billion fund real is much more important than anything else; so is finding ways to share technology. Getting an agreement on everyone cutting emissions is less important. We need a way of finding money that's not dependent on the largest of nation states (i.e., the antithesis of the World Bank or the IMF). In New York, for example, there's a fee on every kilowatt-hour of electricity generated that will generate $500 million in this state for renewable energy. We need a user fee structure to establish this type of fund between nations.

The key to the climate problem is solving the energy problem. We need money in research and development. Government needs to focus on technological development. If we trade away things like offshore drilling now, that s not such a bad thing so long as we then get a price on carbon either through tax or a cap. If that happens there's obviously less incentive to exploit those areas unless our motive is to get at fossil fuels for other purposes such as petrochemicals. Environmental organizations should focus on basic research and development in renewable energy, because all the other things are less important. Solve renewable energy, and everything else is taken care of. Government has to play a role in developing low-cost renewable energy sources that can gradually replace older fossil fuel driven generation technologies. It is inexplicable given the trillions of dollars governments around the world spend that no one has yet developed a $100 billion research and development fund to solve energy needs.

4. Jerry Clifford – Former Deputy Assistant Administrator for EPA Office of International Affairs
Under the Bush administration, Treasury Secretary Hank Paulson had a very good relationship with China. Furthermore, the work EPA did with China in the creation of the sulphur dioxide market is a good model. The newly revamped Strategic & Economic Dialogue has moved environmental issues to the highest level of government. China has Five Year Plans that they follow closely, so understanding where they are in the cycle is important.

China's National Development and Reform Commission is the body that makes decisions on environmental issues in China. One problem is that United States does not have an equivalent to the NDRC. Environmental organizations should concentrate efforts within the university system in China. From a strategic point of view, getting university recommendations is very important, as the universities have a lot of influence on the Chinese government. In the short term, environmental organizations needs to get a copy of the upcoming Five Year Plan and its stipulations within both the Ministry of the Environmental Protection and NDRC, which will be difficult to do. Depending on where the state planners are in the cycle, environmental organizations could identify what it would like to see in the next plan and then go through the universities to influence the legislative process.

In the long term, environmental organizations should remember that India is going to have a larger population than China. Because India is a democracy, it will take twice as long to get them to do anything, so it is best to start planning and implementation now. If environmental organizations are not putting efforts into India on climate, they should certainly think about it.

5. Brannen McElmurray – Director of Environmental Commodities, NRG Energy; Columbia University School of International and Public Affairs
The industrialized world should have hard emissions caps while China comes up to speed, and caps on the developing world should be intensity-based caps, which will not decrease aggregate emissions but rather are a promise to increase energy and industrial efficiency on a relative basis over time. The dynamic at Copenhagen became much more about trade and competitiveness than anything else.

Environmental organizations have two options. First, at some point, the United States will become isolated with respect to climate change and will have to come along, and their negotiation position will only weaken through time. A persuasive argument for environmental organizations is that a climate scheme is inevitable, and that the United States should join at a relative position of strength. Second, environmental organizations could try to push hard on a domestic scheme in the United States, even though it may be limited or transition over a long period of time. Anything that takes hold in the United States makes it incrementally easier to adopt into an international scheme. Looking at United States' history, it will be difficult for the nation to opt into an international scheme, take that back and force it upon the states. What traditionally happens is that state and regional programs emerge and are subsequently nationalized, then over time get accepted. It is then quite easy to just link the systems.

Most international financial systems have started through linkages, or domestic systems becoming linked and integrated over time. Unlike financial systems, carbon markets are emissions oriented. Typically there are not many international players that have generating assets both at home and abroad of scale that can force linkages. The only reason a scheme would be linked is for offsets, not allowances per se. It doesn't matter where emissions reductions are made, because the goal is net reductions.

6. Michael Gerrard – Columbia Law School
Copenhagen was disappointing. It showed the virtual un-workability of the current United Nations process as a way of achieving meaningful agreement on difficult issues. But we have seen over the past several years a great deal developing in multilateral forums. We will see a continuation of a large number of ad-hoc meetings

and meetings of groups that are called for other purposes. The single most important blocking force in the world is the United States Senate. It will be very difficult to get around inaction by the United States.

REDD is a completely discrete problem, but it is a problem on which meaningful progress can be made. There are a lot of issues that need to be worked out in a REDD agreement, and all of those kinds of things can be done in isolation. There has also been a lot of talk of sectoral approaches (e.g., cement industry), and that is very productive. Coming up with international standards on aircraft is entirely sensible. A technology agreement on aircraft or shipping would be very feasible, and should be pursued; it would be necessary to have some kind of linkage with GATT. Ultimately, climate change is a problem of such magnitude that it will require command and control, taxation and information disclosure, in addition to market mechanisms.

7. Sonia Medina – U.S. Country Director, EcoSecurities

The United Nations should be the place to approve an agreement, but the organization should be accompanied by a series of meetings that break ideas off into smaller groups. This way, by the time you get to the United Nations, its role is merely to rubberstamp. The United Nations is not the only forum in which to finalize agreements. In addition, the world is waiting for the United States to move on domestic legislation; Japan has announced a new legislation, but has not yet put it in place because the United States has not made a move. The E.U. should continue to push other countries for 2020 targets and hopefully 2050 targets. BASIC countries should recognize the accord and announce intensity targets, which they have done. Also needed is a separate forum like the MEF, G-20, or G-2. A liaison group from the small islands and Africa could represent this contingent's concerns; otherwise when it gets to the United Nations there may be a repeat of Copenhagen. Though North-South politics could imperil such a tactic, it is the only route to move forward because the United Nations process is too slow.

There is a little chance for any type of legislation in 2010. The Mexico Conference will likely fail as well because we are making the same mistakes as with the Copenhagen Conference. There are no meetings in place, we still do not know who is going to replace Yves de Boer, and there are no serious discussions going on. We need more time. The United Nations negotiations will happen when domestic legislations are in place; 2011 could be the breakthrough. That being said, developments in REDD could be significant. While there is a lot of work to be done, 2010 could be the year a lot of the building blocks are put in place so that 2011 can be a success. You need discussions with Brazil, Indonesia and other major REDD powers so that they all agree on what sort of international mechanism they will be willing to accept. Progress on REDD is critical because there is a lot of investment that can go into REDD today that is stalled because of pending questions: Will it be a government-to-government program? What will the role of the private sector be?

CDM could be reformed via a programmatic approach where you can bundle a large number of projects under one umbrella. CDM has been good for low-hanging fruit and relatively large projects but it has really failed small projects because the transaction costs of going through the United Nations system are high. However, if you are able to bundle things and bring down transaction costs, you are getting to an interesting mechanism that can reach out to sectors of the economy that can then benefit from carbon credits. In addition, the CDM board needs to become a professional body with fulltime employees. Such reforms will be extremely helpful for Africa, which has been left behind for a very simple reason: the CDM has been about emissions reductions projects.

8. Don Melnick – Director, Center for Environment, Economy and Society, Columbia University; Professor of Conservation Biology at Columbia University

Many people think Cancun will be just as much a failure as Copenhagen was. Many people say the G-20 will be where things happen, as long as agreements are sensitive to other countries, such as forested countries or small island states. In the best of all possible worlds, everyone would be included in crafting this decision, but it does not seem very likely.

Enforcement is another issue: will agreements be externally monitored? Or will every country put up its own domestic plan within the context of the bigger plan? There would be a reporting system, which is what happens with Kyoto now. The two major emitters, the United States and China, don't like the idea of verification. Therefore, 45% of emissions might not be verified at all. Perhaps NGOs could serve as independent auditors. The "bottom-up" approach is code for every country doing its own thing, just signing on to the general philosophy; that is valuable in meeting the goal of reducing emissions. I do not know if it is possible to get much more than that.

It is hard to see how REDD could be a standalone agreement, unless it is completely separated from the process of reducing greenhouse gas emissions. If you really want to motivate avoiding deforestation, you are going to have to link it to something; the currency is reduction in carbon emissions right now. The problem with that is, it hitches it to any kind of agreement to reduce emissions. You have to have demand. Without demand, there is no market, and without a market, you are just back to paying people not to deforest. If you want to have a market driven motivation for avoided deforestation, there's got to be a market somewhere. It doesn't have to be a global market; it could be regional or national markets, or bilateral agreements. Legislation in the United States could be one.

There are a lot of interesting ideas about what REDD is going to be doing and what it means. One of the issues that the E.U. has had is that it will flood the market with credits, which is a preposterous idea. If the United States were to pass legislation tomorrow, there would be high demand but zero supply. The big energy companies are not worried about the market being flooded, they are worried about there being no credits to supply. You have to get started now, and it takes a while to create this supply. There is not even an accepted verification process. In terms of funding, expectations should be scaled back. In terms of the United States' Copenhagen pledge of $1 billion, it is not any new money; they are re-packaging old commitments.

9. José Antonio Ocampo – Columbia University School of International Affairs; Former United Nations Under-Secretary General for Economic and Social Affairs

The WTO is a successful international organization because it has a built-in accountability mechanism (unlike the moral accountability system of the Kyoto Protocol). Accountability is absolutely necessary in a climate change agreement. With regard to punishment, trade could be a sanctioning method, but there are other ways of sanctioning, such as financial penalties where the money goes into a global adaptation fund. There cannot be a club strategy without the right players, as they have to sit together to sort out a solution.

The United Nations process has several key advantages. The United Nations provides legitimacy to an agreement, and because negotiations are never a linear process and internal pressure within the UNFCCC is important, many countries can, singly or as groups, apply pressure to other groups or individual countries. For example, removing small, developing nations from the negotiating process may not be wise, as it is likely that small nations group together to try to influence the negotiations between other groups and may make a difference in the negotiating process. Therefore, a solution outside of the United Nations may not be easier in terms of the negotiation process.

From a negotiating perspective, a potential international climate agreement could take the form of what could be called a global pool of differentiated solutions. Because of common but differentiated responsibilities, negotiating for one system is almost impossible. Instead, an international agreement could be designed where each country signs on to a legally binding agreement, but where each country has individualized responsibilities and/or targets. For example, Brazil could commit to reducing deforestation, and OPEC nations could commit to using advanced technology (like carbon capture and sequestration) to capture carbon, and the United States may be responsible for technology development and transfer (while retaining intellectual property rights). The idea is that each country is bound to an action, but that action is

not the same for all countries.

10. Namrata Patodia – International Fellow, Pew Center on Global Climate Change
The questions after Copenhagen are: how will we proceed to Mexico, and how can you build trust again between countries? Pew is focused on domestic legislation in order to achieve an international agreement going forward.

Key relationships between countries that may affect the UNFCCC regime include the fact that India and China have an agreement that they will not sign anything with border taxes. Monitoring, reporting and verification is the most contentious issue and this will be the pillar of any agreement. Involving MEF countries is essential. With regards to the Asia-Pacific Partnership, this would not be a good area to focus resources, as the APP is complementary to Kyoto. Funding is not very high in the United States, however, and therefore the APP does not have a good reputation historically.

11. Jose Pascal da Rocha – Conflict Mitigator for clients such as United Nations, EU, NATO
Small meetings should be held before major forum meetings to find areas of compromise and common goals, and to set priorities. There should be a focus on extracting material that will build up to consensus. The United Nations is a good negotiation forum; it should set the world agenda by working as a chief mediator but appoint small-scale mediators by trying to build consensus on certain topics.

Trust is a long process, it doesn't happen overnight. If you want to use trust you need to build coalitions and find credible negotiators such as South Korea and Mexico. The use of pivot states such as these countries is important.

Going outside the United Nations process does not seem to be the answer, because a major problem is accountability. Who is responsible for setting goals and enforcing them? Who ensures transparency? The United Nations has to recognize the value of sovereignty and the value of trans-national cooperation as well. The climate change debate shows the drawbacks of the negotiating process. Perhaps the Deputy Secretary General should be more of a corporate type who sets deliverables and deadlines. Finding a solution may be about putting key, credible personalities in key positions. Or it may involve getting the United Nations to be the umbrella organization, and inviting the G-2 and G-20 under that umbrella.

12. Adam Shepherd – United Nations MDG Carbon Facility
There has been a bit of a shift of emphasis and power away from the idea of coming together under the UNFCCC. There is now the potential for greater fragmentation in climate policy nationally. It would be good if the carbon markets came together under one umbrella, though it seems like at least in the short term, we are looking at action on regional and national bases rather than international.

The EU-ETS relationship to the Kyoto Protocol is an example of a regional scheme that allows linkage on certain conditions. The fundamental thing between linking schemes is that there must be confidence in the environmental integrity of the scheme being linked to. EU-ETS administrators say that with the exception of percentage limits and a couple of project types, they believe in and trust the Kyoto Protocol for creating carbon credits. However, the EU-ETS does not recognize the import of credits from the voluntary carbon markets because EU-ETS does not have faith in the protocols.

From an administrative perspective, having a global cap and trade scheme would be the easiest. However, when negotiated between sovereign powers, international regulation requires cessation of power and this outcome is not popular – particularly when the regulation affects national economies. That is what we saw play out in Copenhagen, and that is why we are seeing this fragmentation and linking of markets. Fragmentation allows governments to remain in control. A positive outcome of this fragmentation is that

emissions trading and the carbon markets create a kind of middle ground: they create an opportunity for developing country engagement by incentivizing clean development. There needs, however, to be a re-adjustment of expectations.

Excluding developing countries from a climate change mitigation treaty **can** be dangerous when countries go out on their own paths. If departing from the international process and doing smaller side agreements is just going to be an avenue for governments to create the perception that emissions are being reduced, then that is a dangerous path to go down. When you let everybody do side deals, you lose the bigger picture. There is a certain level of efficiency and integrity to centralizing this type of process, and even if there are fragmented or regional agreements between only top emitters, there is room for engagement from developing countries through offsets. Yet if there is an impending need to mitigate climate change in the short term, and consensus based process is not bringing us to a solution, then we have to try other options.

13. Walter Vergara – Lead Engineer, Latin America and Caribbean Regional Office, The World Bank
The CDM works, but should be working on a much higher platform. China is participating in the CDM as a seller of Certified Emissions Reduction credits, but it should be a buyer.

14. David Victor – University of California, San Diego; formerly affiliated with Stanford Law School and Council on Foreign Relations
A lot of individual country efforts will arise in a "bottom-up" sort of way, and eventually we will begin to stitch these together. These developments are very important for environmental organizations to recognize; if these organizations advocate for using emissions trading as a mechanism, credible policies are needed. Smaller bottom-up approaches are very good news and ought to be advanced as quickly as possible. That is a much more practical way of getting to a meaningful trading system. The shake-up at Copenhagen may be valuable for future climate change mitigation efforts.

Nobody has any idea if the Green Climate Fund is real. The numbers are all based on carbon finance, and carbon finance is built off national policies that are based on financial instruments like carbon credits, which can be traded across borders; so there are a lot of uncertainties. In the United States, which will be the single largest market, we are nowhere near that right now. If we did get close to it, we would probably not have a mechanism that would allow tens of billions of dollars to move overseas. Likely, the $100 billion was more of a negotiating tactic than a reality. A problematic aspect of the Copenhagen process was that was not enough analysis of the solidity of pledges made.

The international process has no impact on United States' climate legislation. The next 6-12 months are going to be a bleak period for the negotiations because there is no strategy. Environmental organizations should not put much stock into big global or international institutions, but instead find practical, smaller markets where governments are able to make credible decisions (e.g., New Zealand, Australia, parts of the United States). Trading schemes based on those decisions would be as credible as possible, and that would mean opening windows or docking stations to other governments in the developing world that are also able to make some credible decisions. Environmental organizations should consider initiatives dealing with geo-engineering and adaption based on the very real probability that there is going to be global warming above 2 degrees Celsius. In terms of mitigation and reaching a goal of 70% or 80% mitigation, the goal is fictional. Likely, when you add up what governments are willing and able to do over the next few decades, it is nothing close to 50% cuts in global emissions, and thus nothing close to 2 degrees Celsius.