Climate Policy for the 21st Century

Meeting the Long-term Challenge of Global Warming

[DRAFT]

Pre-Release Copy.

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Edited by David Michel

Michel, David, ed. *Climate Policy for the 21st Century: Meeting the Long-Term Challenge of Global Warming.* Washington, D.C.: Center for Transatlantic Relations, 2003

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Capacity Challenges and Future Commitments under the Climate Convention

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Abstract

This chapter examines the capacity needs and constraints faced by governments in relation to making future climate protection commitments under the UNFCCC. The historical progression of commitments of countries over the past decade has spurred a concomitant progression in capacity growth. The future strengthening of the climate regime will be influenced by what can be realistically achieved in terms of capacity development in the next decades in different parts of the world. This chapter identifies three main levels of assessing capacity: system, organization, and individual. It also considers three types of capacity needs which arise within the UNFCCC: participation in international negotiations, domestic policy formulation and implementation, and monitoring and reporting of emissions. Each of these capacity needs are discussed with respect to the various forms of GHG commitments under consideration by the international community (policies and measures, non-binding targets, sectoral targets, fixed emission targets, dynamic emission targets, targets with price cap) showing that a progression in commitments post-2012 necessitates a related progression in capacity requirements. It is in the interest of both North and South to agree on a focused capacity development agenda, which both sides actually implement according to their differentiated roles and responsibilities. In the absence of such a working contract, a regime that needs continuous strengthening might only be weakened through non-compliance.

Introduction: Capacity in an Evolving Climate Regime

This chapter examines the capacity needs and constraints faced by governments in relation to making future climate protection commitments under the UN Framework Convention on Climate Change

(UNFCCC). Compared to the principles of "equity" and "common but differentiated responsibilities," which have achieved an almost mantra status in the UNFCCC negotiations, the principle of "capability" (or capacity[2]) has been given relatively short shrift by analysts and policy-makers. Generally, capacity refers to the ability of individuals, institutions, governments, and other entities to perform functions, solve problems, and achieve objectives.[3] More narrowly, the UNFCCC refers to the capacity of countries to "protect the climate system" (Article 3.1).

In deciding on future commitments, the relative capacities of governments and societies to implement these commitments should be an important consideration. Indeed, the ability of governments to make, keep, and comply with promised actions will have important implications for the overall effectiveness of the climate regime. Brown Weiss and Jacobson point out that most instances of non-compliance with international agreements are not willful, but due to lack of state capacity.[4] In the ozone protection regime, Benedick states that it was understood early on that non-compliance would probably be the result of capacity-related factors like political disruption, technical challenges, or inability of governments to control private actors, rather than willful breach.[5]

In fact, history already shows a dynamic relationship between capacity and international obligations. While the capacity to protect the climate system has been built gradually according to the obligations assumed by different groups of countries, it is also the case that the level of capacity has to some extent determined the type of obligations that countries have been willing to assume. It is foreseeable that future capacities will develop in response to the commitments that countries may take on following the Kyoto Protocol's 2008-2012 commitment period, but also that the current capacity levels will continue to be a factor in defining the nature of those commitments. Thus, it is helpful to examine possible future options in light of the past progression of commitments within the UNFCCC.

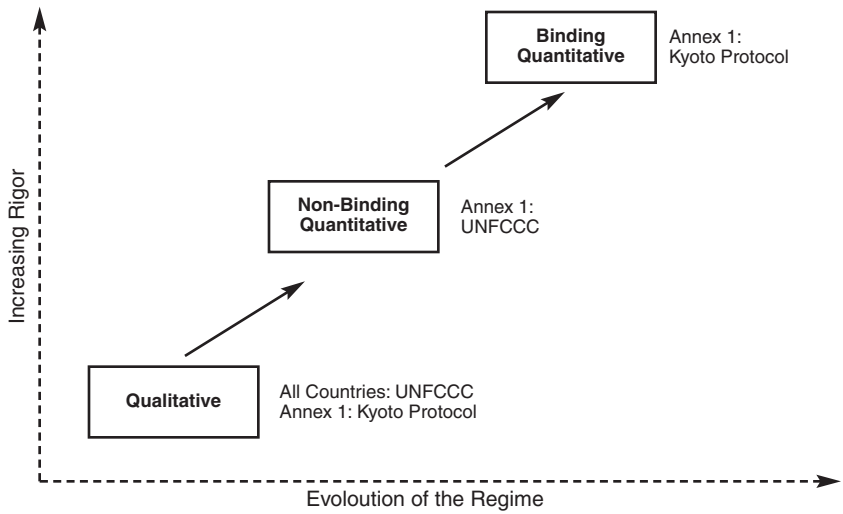
The period prior to 1992 saw no climate-related commitments of any kind for any country. Talks within the Intergovernmental Negotiating Committee from 1990 to 1992 represented the process of initiating commitments on the part of all countries, as well as the process of determining which countries would take on what types of

commitments. The resulting 1992 UNFCCC agreement took the first step by endorsing the concept of differentiation, calling on governments to "protect the climate system on the basis of equity… and in accordance with their common but differentiated responsibilities and respective capabilities." (Article 3.1) Accordingly, Annex I (developed) countries took on voluntary reduction commitments, and non-Annex I (developing) countries voluntarily adopted measurement, reporting, and some policy commitments, but no emission limitations.

The 1997 Kyoto Protocol was the second step, under which Annex I countries adopted legally binding reduction commitments, and non-Annex I countries maintained their existing obligations under the UNFCCC. Thus, there is a two-tiered progression in the evolution of commitments. The first tier is the movement from *qualitative* commitments (policy, measurement, and reporting) to *quantitative* commitments (emission reductions). This is the step taken by Annex I countries in the 1992 Climate Convention. The second tier is the shift from *non-binding* to *legally binding* commitments. This is the step taken by Annex I countries under the 1997 Kyoto Protocol. This progression is shown in Figure 1.

In principle, this progression should influence the next phase in the climate regime. Annex I countries, for their part, should not regress from legally binding reduction commitments, but rather must move

Figure 1 Progression of commitments



to deepen them. As regards non-Annex I countries, the time may have come to differentiate between them according to their respective responsibilities and respective capabilities. It is not unthinkable that the next phase in the climate regime might segment developing countries into groups (see Gupta, this volume), including a group that continues only with existing UNFCCC commitments and another that takes on some type of non-binding reduction commitments, analogous to the commitments taken by Annex I countries under the UNFCCC. Depending on the robustness with which Kyoto Protocol reductions may be achieved, there might even be a third group of developing countries which, because of their greater responsibility and broader capability with respect to other non-Annex I countries, would take on some form of legally binding reduction commitments. The possible differentiation of commitments within the developing countries will be a difficult process, and there are many potential options.

As noted, the historical progression of commitments has spurred a concomitant progression in capacities. All countries have been developing expertise in greenhouse gas (GHG) inventories and national reporting since the mid-1990s in order to comply with the UNFCCC. Some industrialized countries have gone further by structuring policies and measures, including emissions trading programs, to comply with the Kyoto Protocol. There is still much capacity strengthening to be done within Annex I countries with respect to trading mechanisms, and certainly within non-Annex I countries for the current measurement and reporting requirements.

But this historical progression also suggests that capacity itself will be developed in stages, and that strengthening the climate regime post-2012 raises the question of what can realistically be achieved in terms of capacity development in the next decades in different parts of the world. While it is important to recognize that the existing national capacities are not a fixed constraint to assuming future commitments, it is equally important to stress that capacity development has its own dynamic. In other words, new commitments must be considered in light of the need for stronger and more capable institutions as well as the need for political will and financial resources.

The first section of this chapter briefly discusses the general concept of capacity, identifying three main levels of assessing capacity: system, organization, and individual. The next section then discusses

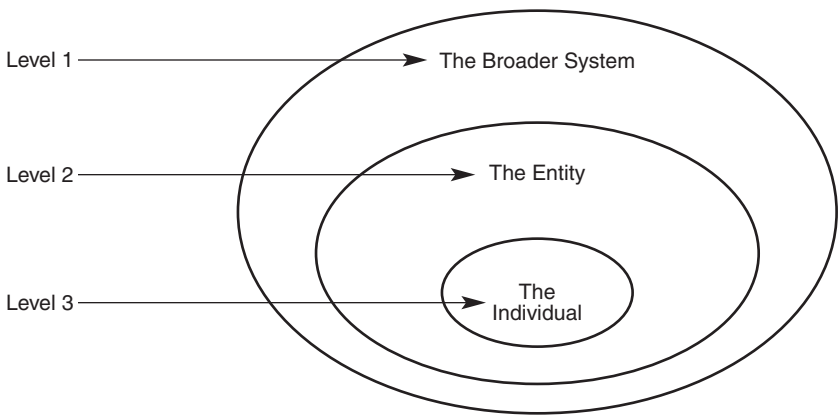
capacity needs that are likely to arise as climate negotiations progress. They include (1) participation in international negotiations, (2) domestic policy formulation and implementation, and (3) monitoring and reporting of emissions. The final section discusses the capacity needs specific to the different forms of GHG commitments which are under consideration by the international community.

The Concept of Capacity

Capacity is generally understood to mean the ability of individuals and organizations to perform functions effectively and efficiently over time. Thus, the concept of capacity is related to training, human resource development, and knowledge acquisition.[6] It is also a dynamic concept; capacity development generally means acquiring the continuing ability to undertake certain functions, rather than merely perform one-off tasks.

Capacity needs are commonly assessed and analyzed at three different levels (see Figure 2).[7] First is the *system level*. System level capacity includes broad concepts such as the functioning of government programs, markets, and the judicial system, among others. This level involves multiple organizations that may need to function effectively together in order to accomplish objectives. The second level at which

Figure 2 Level of capacity within a systems context



Source: UNDP, 1998

capacity is analyzed is the entity or *organization level*. Dimensions of capacity at the level of a particular organization include an organization's authority, mission, structure, culture, resources (including financial, information, and human), and physical infrastructure. Finally, *individual level* capacity includes the training, skills, and competencies of individual staff members. Each level integrates with the others. Skilled and competent individuals, for example, are necessary to make organizations function effectively; effective organizations, in turn, are needed to make a system run properly.

As the next section illustrates, all three levels of capacity are critical for the successful implementation of climate change policy.

Capacity Needs and Climate Protection

Over the nearly two decades since the UNFCCC discussions first began, all countries have developed some individual, organizational, and system level capacities relevant to climate protection and the implementation of the Convention. Much has been achieved, but much more is needed. This section analyzes the growing capacity needs of governments with respect to their engagement in global efforts for climate protection. These needs are divided into three categories: (1) participation in the international negotiations; (2) domestic policy formulation and implementation; and (3) technical requirements, namely monitoring and reporting.

To some degree, each of these categories is common to the various forms of future commitments—discussed below—being contemplated by the Parties to the Climate Convention.

Participation in the International Negotiations

The Convention and Protocol call on countries to periodically consider future commitments (UNFCCC Article 7.2; Kyoto Protocol Article 13.4). When official discussions begin in earnest, they are likely to be intense and complex, characterized by frequent meetings covering a wide range of proposals for future commitments. It will be important for all countries to be adequately prepared for these complex and protracted negotiations. The requirements that support effective international participation are substantial, and include the following:

1. *National-level coordination.* If governments are to make lasting commitments at the international level, they must have the backing of powerful national institutions representing finance, trade, energy, national security, and other important interests. Accordingly, many countries have established inter-ministerial working groups or other bodies to try to perform this coordinating function. This may be especially challenging for some countries, particularly when environmental ministries and agencies head inter-ministerial groups and national delegations. These bodies may be institutionally weak, lacking the authority to influence policy at the national level. Although levels of participation and buy-in vary widely, the Argentine National Commission for the Elaboration and Proposal of a GHG Emissions Target is one example of an authoritative and participatory body created specifically to develop a national emissions commitment.[8]

2. *International coordination.* Similarly, governments must coordinate with one another on formulating common positions prior to and during the negotiation process. All countries are part of overlapping regional and political groupings that negotiate in part as blocs—e.g., G-77, Umbrella Group, Alliance of Small Island States (AOSIS). Formulating common strategies and negotiating positions within these blocs is necessary for negotiations to function effectively and efficiently. Yet governments—particularly those from developing countries—often lack the ability to meet and strategize prior to negotiations. Financial, logistical, and human resource constraints prevent better coordination among governments. Thus, it is not uncommon for official negotiations to be delayed while regional and political blocs hash out common strategies and positions.

3. *Strong and stable delegations.* Currently, there exist well-known disparities in the capabilities of national delegations. While many industrialized countries have large delegations with substantial scientific, legal, economic, and policy expertise, developing country delegations are often small and inexperienced. The turnover among delegates is rapid, and many delegations lack members that work full-time on climate change. Lack of

staff continuity and expertise can be a major barrier to effective participation in the negotiations.[9] The UNDP-GEF Capacity Development Initiative speaks of the "perennial drain of . . . human resources to other groups such as intergovernmental or private agencies."[10] Overcoming these challenges will require competitive salaries and a deep roster of civil servants that are conversant in the complex and demanding issue of climate change. Thus, while *individual* level capacity is essential for strong delegations, *system* and *organization* level capacities must also be in place to support the necessary staffing, training, and salaries.

4. *Analytical capacity.* So too, governments must have strong analytical capacity to assess various options for national commitments, including both the form of possible commitments and the stringency of commitments. This kind of analytical capacity must be deployed both in a reactive and proactive manner. First, governments must be able to understand what proposals tabled by others would mean environmentally, economically, and socially in their country. Second, many governments must be prepared to proactively advance their own ideas and proposals with respect to future commitments. For example, in establishing their national target, Argentina formed a technical team in 1999 that carried out baseline studies, recalculated national and sectoral inventories, elaborated socio-economic scenarios, and investigated mitigation options.[11] This capacity needs to be developed within governments and civil society.

These kinds of institutional needs and arrangements might be considered, to some extent, prerequisites for a fair and effective future commitments negotiation process, as well as prerequisites for the adoption of a legally binding target by some countries. They might also be considered necessary for domestic ratification of any agreement reached internationally.

Domestic Policy Formulation and Implementation

Many countries will need to implement some kind of domestic legislation in order to meet the substantive demands of a particular commitment. In many cases, developing and implementing the necessary domestic legislation to address greenhouse gas emissions will be a sub-

stantial challenge. Most greenhouse gas emissions come from sectors such as electricity generation, industry, and transportation which are important to national security and economic growth. Powerful and entrenched interests in key sectors can make the transition to climate-friendly policies an uphill political climb. The interwoven capacity needs include the following:

1. *Inter-ministerial cooperation and communication.* As described above, the nature of the climate change issue demands a great degree of participation and cooperation among government institutions.[12] This includes government agencies with jurisdiction in a wide range of sectors, including industry, agriculture, transportation, forestry, and energy. Effective participation from executive, administrative, statistical and other agencies (including for measurement and reporting, as discussed above), is also essential to executing a national climate change policy. Inter-ministerial working groups and committees can help promote such coordination, both in the negotiation and domestic policy-making spheres.

2. *Authority of the government institutions promoting climate-friendly policies.* Even if coordination is strong, environmental institutions are often weak (including the aforementioned coordination bodies). They are often new creations that lack the political weight needed to influence key governmental decisions. Despite significant advances, Bucher describes environmental institutions in the context of Latin America and the Caribbean as being "at an incipient stage of development, lacking resources, authority, and links to other sectors."[13] This presents a major barrier to progress.

3. *Domestic policy assessments.* There are myriad policy options available for domestic implementation of climate policies and measures, including efficiency standards, technology requirements, targeted taxes or subsidies, and tradable permits, among others. Which approach or combination of approaches is best suited for the national circumstances of a particular country? Likewise, how will climate policy considerations be integrated into other important national processes such as privatizations, energy sector restructuring, infrastructure investment, economic planning, and EU accession, among others?

Answers to these questions will require a concerted effort and the engagement of a wide variety of stakeholders.

4. *Financial solvency and human resource capacity within government institutions.* Many ministries suffer from chronic under-funding. This, combined with other institutional deficits, inhibits the ability of environmental ministries to plan and implement environmental policies, especially when such a plan would impact key economic sectors. Perhaps as a consequence of limited funding and weak institutional mandates, environmental institutions at the domestic level often have difficulties retaining qualified personnel. In some cases, significant investment in training and staff capacity results in a flight to better paying jobs with international organizations.[14]

5. *Functioning markets and incentive systems.* Some domestic policy approaches, such as taxes and tradable permits, assume that economic incentives will guide behavior. Yet, in countries without a history of well-functioning markets and economic stability, it is not necessarily the case that well conceived policies and measures will have their intended effects. For example, Greenspan Bell points out that environmental taxes have a long history of use in economies in transition, yet they have not been effective in reducing pollution.[15] Rather, they have functioned as a revenue raising tool for governments. Similarly, emissions trading systems presuppose that a market will "form" and participants will dynamically seek out the lowest cost abatement opportunities (see Bayon, this volume). If there is no underlying competitive market for everyday goods and services (or legal institutions to ensure secure transactions and legal remedies), these approaches may not live up to their theoretical potential. Here, system level capacities, which often take a long time to develop, are essential.

6. *Enforcement capacity and a "culture" of regulatory compliance.* Making commitments should mean keeping them. However, in many instances governments do not have the capability to exercise regulatory control over private (or even public) entities. Some countries have an impressive array of legislation in place, though little of it is enforced; non-compliance is rife.[16] Countries that lack efficient (or functioning) court systems, a

free press, and the ability to collect taxes, for instance, will probably be the same ones that have difficulties implementing ambitious domestic climate change policies.

In other instances, governments may be able to effectively monitor and enforce regulations for large stationary sources, but not for other sources that are widely dispersed in sectors like agricultural or forestry. Making and enforcing public policy can be especially challenging due to jurisdictional and other issues associated with land tenure and indigenous populations.

7. *Public awareness and public support for climate protection.* At least to some extent, governments must garner support and participation from key constituencies, including industry, provincial governments, NGOs, and the public. Without the support and participation of these constituencies, subsequent domestic implementation of an international commitment may be difficult or impossible.

There is a need for greater public awareness and stronger political support for climate change policies in all countries. Levels of public awareness and knowledge about climate change, including its adverse impacts, are relatively low, and climate is rarely a major political issue. Without greater public awareness and activism on this issue, climate change risks continual marginalization in government policy-making. Non-governmental organizations, as well as public institutions, have important roles to play with respect to increasing public awareness and support of climate protection. This need is squarely recognized in the Climate Convention, which calls on governments to cooperate in education, training, and public awareness activities to promote civil society participation and engagement (Articles 4.1(i) and 6).

Overall, it is not surprising that challenges associated with developing and implementing climate change policies are more acute in developing countries. This is due to factors such as weak government institutions, lack of human resource capacity, the lack of political importance attributed to climate change in general (and greenhouse gas abatement in particular), as well as the fact that emissions in many developing countries are dispersed especially widely in hard to regulate sectors. These factors cut across all three levels of capacity: individual, organizational, and system.

Technical Requirements: Monitoring and Reporting

In one sense, measurement, monitoring, and reporting of greenhouse gases are part of domestic policy implementation, discussed above. However, because of their technical nature and rather specific capacity needs, they warrant special treatment. Domestic monitoring and reporting systems also differ in that they must conform to a detailed body of international guidelines. Common guidelines have been developed to ensure that the information provided is consistent and comparable across countries.[17] These requirements have been developed over the past decade pursuant to the Climate Convention's requirements for inventory and National Communication obligations (Articles 4 and 12).

Whatever form of mitigation commitment is agreed as the result of the next round of the negotiations, it is likely to include specific monitoring and reporting commitments that build on existing requirements. Although future obligations may differ from current ones, a useful basis upon which to assess capacity needs is the existing set of Guidelines for Annex I Parties "for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks."[18] These guidelines are only concerned with one type of monitoring and reporting system (Annex I, under the Kyoto Protocol), but it is possible to generalize the description of the essential steps needed to develop such systems.

1. *Planning.* In many countries, monitoring systems for climate have tended to develop in an ad hoc manner. However, monitoring requires collecting and treating vast amounts of data coming from many different institutions. In order to reach a certain quality level with limited resources, a strategic approach is needed whereby institutional arrangements, procedures, and priorities are clearly set before the actual work begins. For instance, the inventory guidelines mention the need to define quality objectives and develop a "quality assurance/quality control (QA/QC)" plan, which specifies QA/QC procedures to ensure that quality levels are reached. Both managerial and technical skills are needed for that purpose.

2. *Data preparation* refers to collecting, compiling, reviewing, and reporting data according to the appropriate methodologies. These are resource-intensive and time-consuming tasks

that require specific technical skills. However, even if an efficient system has been set up, the weakness or absence of underlying statistical data may raise major difficulties. Agencies responsible for environmental monitoring may not be able to influence the quality of statistical data because such data are collected in independent statistical agencies. The experience of countries with economies in transition suggests that these agencies may even lack the legal authority for collecting certain data related to GHG emitting sources.[19]

3. *Data archiving.* Data must be stored according to standard procedures so that it can be accessed in the future. In many countries, data preparation is done by a few experts without due consideration of how such data is archived. If key personnel depart, the expertise and knowledge may be inaccessible to new staff. This function requires specific technical skills, often related to information technology.

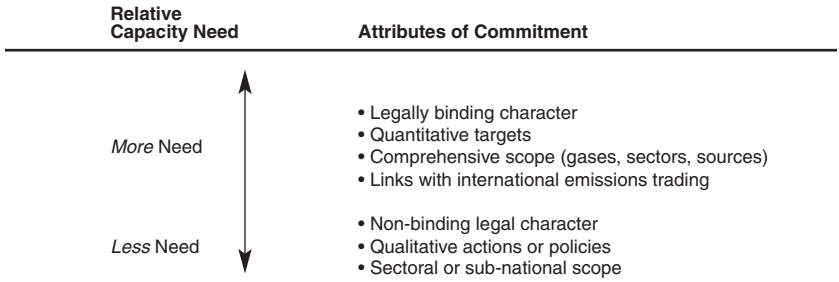
The above needs are generalized, in that they relate to any form of commitment that a country might adopt. The following section focuses on specific capacity needs in relation to different forms of future GHG limitation commitments. It is important to note that, in all cases, the *stringency* (and not just the *form*) of commitments also has an important bearing on capacity needs.

Capacity Needs under Different Forms of Commitments

Many basic capacity needs are common to most forms of mitigation commitments. However, some forms of commitments may heighten some of those needs, while others will put less pressure on capacity development. This section provides a preliminary analysis of capacity needs for some of the main forms of commitment that have been discussed in the literature on the evolution of the climate regime, showing that a progression in commitments post-2012 necessitates a related progression in capacity requirements.[20] Figure 3 illustrates the indicative relationship between capacity needs and key attributes of the various commitments examined in this section.

Each subsection begins with a brief description of the particular form of commitment followed by a discussion of the relevant capacity consideration. The discussions of capacity needs invoke, to varying degrees, the three categories introduced in the previous section, namely (1) participation in the international negotiations, (2) domestic policy formulation and implementation, and (3) measurement and reporting.

Figure 3 Indicative relationship between capacity needs and attributes of mitigation commitments



Policies and Measures

It is not unrealistic to think that many, if not most, developing countries will continue within the Climate Convention's system of *qualitative* obligations, not moving to quantitative commitments by 2012 or even beyond. Winkler et al. outline one such approach—the concept of sustainable development policies and measures (SD-PAMs)—whereby countries adopt a basket of policies and measures that are primarily geared toward their national sustainable development needs.[21]

As noted above, public awareness and public support for climate protection are a key institutional need in implementing domestic climate policies. SD-PAMs would have the advantage of not needing to overcome this obstacle because it is oriented expressly around national sustainable development objectives and needs, rather than a more distant priority like climate change. The expectation is that, by moving toward greater sustainability in their development path, developing countries will start bending the curve of their greenhouse gas emissions downward. This hypothesis is more fully characterized by the

Intergovernmental Panel on Climate Change (IPCC) emission scenarios and other IPCC findings. According to the IPCC, a low carbon future is "associated with a whole set of policies and actions that go beyond the development of climate policy itself."[22]

Monitoring, reporting, and review requirements would be not much different from the obligations currently held by non-Annex I countries. Although monitoring and reporting of emissions (particularly in sectors where SD-PAMs are implemented) would be important, they would require substantially less rigor than for quantitative targets (discussed below). With respect to participation in the international negotiation process, the main need would be domestic planning and coordination prior to the meetings of the Parties. In doing this, national level buy-in and participation in the SD-PAMs development process might be relatively easy to come by, considering that policies and measures would be oriented primarily towards sustainable development needs first, and climate change only incidentally.

On the other hand, governments would still face formidable institutional challenges in formulating and executing SD-PAMs. Many of the obstacles to implementing climate-friendly policies—e.g., lack of authority of environmental institutions—are the same ones that make implementing sustainable development policies challenging. These obstacles will not disappear if actions are framed in terms of sustainable development, rather than climate change. Government agencies might develop an ambitious set of SD-PAMs, yet fail to implement them because of lack of political will, financial resources, or support from the public or other government institutions.

In this sense, institutional capacity issues might be just as great for pursuing sustainable development as climate policy, particularly since sustainable development touches on an even broader array of economic activities and political interests than climate change. However, a development-oriented approach need not necessarily "achieve" sustainable development per se. It may merely involve packaging a new set of domestic policies and measures that have a beneficial impact on emission trends, yet are primarily geared toward other objectives, such as reducing energy consumption, diversifying energy sources, or creating jobs.

Non-binding Targets

One way of increasing the rigor of commitments without imposing a legally binding obligation is to adopt quantitative targets (either fixed Kyoto-style or dynamic targets) in a *non-binding* form, whereby countries would not be subject to mandatory consequences for exceeding their target emission level.[23] The principal example of such targets are the Convention commitments adopted by industrialized countries, which pledged to return their emissions to 1990 levels by 2000.

As already suggested, institutions need sufficient time to adapt and build capacity. One rationale for advancing non-binding targets for developing countries would be to gain practical experience and progressively build institutional capacity in all of the areas discussed above: participation in the negotiation process, domestic implementation, and monitoring and reporting.

In principle, developing countries already have non-binding mitigation commitments under the Convention. Thus, non-binding commitments may not achieve the intended capacity levels (or environmental objectives). On the other hand, however, existing developing country commitments under the Convention do not have any quantitative dimension. *Quantitative targets*, even if non-binding, require specific capabilities. Emission targets that are quantitatively precise, though non-binding, may help developing countries move toward the level of monitoring and reporting capacity—and the resulting information base—needed to eventually adopt legally binding commitments. The process of developing a national greenhouse gas emissions target—even a non-binding one—may also be useful experience upon which to build later. In addition, non-binding targets might help improve domestic awareness on climate change, increase levels of activity (and monitoring) by civil society groups, and raise the political stature of the climate change issue.

Sectoral Targets

The further progression from qualitative or quantitative non-binding commitments does not necessarily have to result in Kyoto-style fixed, binding targets. While commitments can become legally binding, one may start with limiting the scope of those commitments. Kyoto-style targets are nearly comprehensive in that they encompass

all emission sources and certain sinks as well as the six main greenhouse gases. Alternatively, sector-based commitments might encompass those parts of national economies where greenhouse gas emissions are most prominent, such as heavy industry, land use change and forestry, or electric power generation.

Commitments narrower in scope might prove easier to implement, monitor, and report against. In some cases, the expense of adhering to rigorous monitoring and reporting of *de minimus* emission sources might be better channeled toward abatement activities in other, more significant sectors. In addition, for those sectors for which governments are unable to capably estimate and report emissions, it is equally unlikely that they will be able to effectively regulate them.

One approach would be to fashion sector-wide initiatives under the existing Clean Development Mechanism.[24] For example, "Sector-CDM" initiatives might involve a country's entire electric power sector or, alternatively, all sectors within a single geographic boundary (e.g., a municipality). Such initiatives would require related but somewhat different capacities compared to the sector targets described above. Assuming such sector-CDM projects were allowed, the major challenges faced by governments and project developers would be developing credible sector baselines that represent a reasonable approximation of what would have happened without the particular initiative.

Fixed Emission Targets

A *fixed* (or absolute) *target* establishes a maximum level of emissions a country can emit during a specified period. For example, targets taken by industrialized countries under the Kyoto Protocol entail fixed emission ceilings during the 2008 to 2012 period. They are also accompanied by substantial monitoring and reporting requirements (Articles 5 and 7), as well as accountability provisions that aim to identify and discourage instances of non-compliance (Articles 8 and 18).

Fixed targets have the advantage of ensuring a particular environmental outcome via a "cap" on emissions and can promote cost-effectiveness when coupled with emissions trading. On the other hand, some observers have pointed out that negotiating fixed targets can be difficult in some instances due to large uncertainties over future emission levels and the costs of achieving any future emission target.[25]

Participation in the international negotiations. In a negotiation setting, one advantage of fixed targets is that they are already familiar to the international community via the Kyoto Protocol. Nevertheless, they do present a challenge to governments with respect to negotiating. In particular, it may be difficult in many instances to assess the economic effects of various future target options. The uncertainty of future GHG emission levels, especially in developing countries, can lead to serious technical difficulties in establishing a fixed emission limit. Achieving a given fixed target might be very easy under conditions of low economic growth and industrial stagnation, but exceedingly difficult and costly if economic growth were instead robust. This represents a challenge, since experience suggests that when countries are proposing or evaluating a potential emission target they are particularly concerned with economic impacts. Since many governments have a low willingness to pay (and are risk-averse with respect to economic considerations), they might avoid fixed emission targets that have the *potential* to adversely affect economic growth, even if that potential is small.

For example, in Argentina, political leaders sought to devise a target that called for a 2 to 10% reduction in emissions relative to business-as-usual forecasts.[26] This was simply not feasible with a fixed target. The only possible way to formulate such a target was to make it dynamically adjusted to actual economic output.

Domestic policy formulation and implementation. Capacity needs are considerable for implementing Kyoto-style, fixed emission limitations at the domestic level. In this sense, fixed targets should be seen as one of the more ambitious forms of commitment. While all of the aforementioned domestic capacity needs discussed above are important in implementing this kind of domestic target, several stand out as particularly important.

First, Kyoto-style targets are almost comprehensive in scope, covering all major greenhouse gases and sources. Thus, domestic regulations may need a similar, economy-wide coverage. Second, these targets are *legally binding* and *fixed.* This would suggest the need to establish a national system that would require domestic sources meet mandatory emission limits, efficiency standards, or other requirements. This, in turn, might suggest the need to impose mandatory consequences for non-compliance. This need could be especially great

for countries implementing domestic permit trading systems. For example, national trading programs may authorize domestic regulated sources to buy and sell allowances internationally. If regulated sources abuse this right (e.g., by overselling), it is governments, not the violating sources, that will be held responsible under a treaty's non-compliance procedures. Thus, the overall regulatory capacity and "compliance culture" are especially important.

It is important to note that the *stringency* of targets adopted will determine, at least to some extent, the degree of the aforementioned needs. For example, in some economies in transition, commitments adopted under the Kyoto Protocol may be sufficiently lenient (in the face of economic and emissions declines in the former Soviet Union and central and eastern Europe) such that strong regulatory oversight of some domestic emitting sources is not necessary. It might be the case that future commitments for some countries, particularly non-Annex I parties, will not be especially stringent, since these countries have had historically low emission levels and have less capacity to address their growing future emissions.

Monitoring and reporting. A strong monitoring and reporting system is critical to any legally binding commitment. For a fixed national emission target, the national GHG inventory becomes the most important piece of information to assess a country's compliance with the target. More specifically, such targets require the reporting of national inventories that are transparent, consistent, comparable, complete, accurate, and timely, as established in current UNFCCC guidelines.[27]

Providing national inventories that are consistent with UNFCCC and IPCC guidelines is currently a challenge for many Annex I countries. Six Annex I Parties (out of 40) made no submission in 2002. Only 22 Annex I Parties were able to send their inventory information on time. Only 19 Parties were able to send annual inventories for all years (1990-2000) in the appropriate format (among which six were late in their submission). In terms of data completeness (i.e., all gases and sources), the reporting has significantly improved since 1996. However, for some gases—like HFCs, PFCs, and SF_6—reporting is less frequent. Among Annex I Parties, economies in transition have faced particular difficulties, which may portend deeper challenges for developing country Parties in the future.

Developing countries have some experience with the IPCC and UNFCCC guidelines. Although UNFCCC reporting requirements for developing countries give them more flexibility, the required capacity would still take years to develop in the event that developing countries are required to provide national inventories of a similar quality to those requested for Annex I countries. Yet such requirements would be likely in the event of adopting fixed, Kyoto-style targets. In addition to national inventories, adoption of Kyoto-style targets would require the establishment of national registries for any country that would wish to participate in emissions trading. For developing countries, this would be an entirely new requirement.

Dynamic Emission Targets

Under a *dynamic target*, a country's allowable level of emissions is adjusted according to some other variable, such as gross domestic product (GDP).[28] Relative to fixed targets, dynamic targets may reduce economic uncertainty in the target-setting process and promote environmental integrity (i.e., less unintentional "hot air"), particularly with respect to developing countries. Yet dynamic targets pose certain challenges relative to fixed targets, including added complexity and data requirements.[29]

With respect to capacity needs, dynamic targets impose some added demands, as well as some potential benefits, compared with fixed targets. The most significant new capacity needs for dynamic targets are for the estimation, verification, and reporting of GDP.

Participation in the international negotiations. Although dynamic targets are relatively simple in principle, significant learning may be needed for many delegations before they are comfortable with dynamic targets in a negotiation setting. Depledge explains the challenge: "introducing new ideas tends to be a laborious process, due to the cultural, political, and linguistic diversity of the Parties, as well as the limited capacity of many developing countries—some of which have only one person working on climate change—to study, critically analyze, and respond to novel concepts. . . . Continuing with [fixed targets] would bypass the learning process that would inevitably be required for Parties to develop a common understanding of a new concept."[30]

Generally, the particular characteristics of dynamic targets suggest that their use will tend to increase the complexity of the negotiations.[31] Dynamic targets are likely to be uniquely tailored to country circumstances and not easily duplicated by other countries.[32] Such complexity, in turn, can have major implications for capacity needs regarding participation in international negotiations. It can present a barrier to understanding other countries' positions; and thus a barrier to consensus, especially when mistrust between governments is pervasive (e.g., across North-South lines). Proposals that are girded about with numbers, terminology, and other obscurities that are beyond the understanding of all but a few are unlikely to gain wide acceptance. Governments—as well as civil society and the media—must be capable of understanding and critiquing proposed targets, at least to some meaningful degree.

Thus, added complexity points to additional capacity needs of governments and other actors. Country delegations would need the training and skills to understand and assess various dynamic target options, and to consider appropriate ones for their own countries.

Assuming this capacity were in place, however, dynamic targets do offer some advantages, precisely because they offer the opportunity to uniquely tailor a target to a country's national circumstances. So, in some cases, this approach might provide a more useful methodology to designing a national target. Relative to fixed targets, dynamic targets do not rely as heavily on shaky emission projections. The only possible way for a country to formulate a target that ensures genuine emission reductions (regardless of economic growth rates) may be to make it dynamically adjust to actual economic output. For countries that are formulating a target for introduction into the international negotiations, a dynamic one might reduce the burden of developing accurate future emission projections.

The extent of this benefit provided by dynamic targets will vary from country to country. Dynamic targets are likely to prove especially useful for countries with volatile economies and especially unpredictable emission levels. In such cases, the benefit may outweigh the added complexity to the negotiation process. However, dynamic targets may afford little benefit for countries with stable economic and emission indicators, including some industrialized countries.

Domestic policy formulation and implementation. With respect to domestic policy formulation and implementation, dynamic targets would entail institutional needs that are similar to Kyoto-style targets. Whether the needs are "greater" or "less" depends on a particular country's national circumstances and the stringency of the targets.

For example, a domestic emission control program might be easier to implement in that it might reduce uncertainty with respect to the stringency of the commitment. If dynamic targets offer more flexibility as an *international* commitment, then, accordingly, governments might have a greater scope for implementing a flexible *domestic* emission control program. This might increase the likelihood of domestic support for the emissions target, including among the general public and business sector.

On the other hand, if a country wanted to participate in international emissions trading via a domestic trading program, additional challenges may arise with dynamic targets relative to fixed ones. As has been articulated elsewhere, dynamic targets are compatible with international trading.[33] However, it is not clear what a national emissions trading program would look like that was predicated on a dynamic target at the international level. One option would be for domestic policy-makers to develop dynamic targets for the entities participating in the national trading program (e.g., tons of CO_2 per unit of electric power, steel, cement, etc.). However, customizing dynamic targets for all sectors and/or sources would be highly technical and complex, with large implications for capacity needs. It will also be technically more difficult to execute trades using dynamic targets because tradable units are denominated in *absolute* terms while the domestic targets are in relative terms. For example, in the UK trading system, domestic sources that have relative (i.e., dynamic) targets can only trade on a *post-verification* basis. This can reduce the depth and liquidity of the market and so sacrifice some cost-effectiveness benefits.[34]

In any case, additional capacity would be needed in the design and implementation of a national trading system operating under a dynamic target. The reason is that, unlike with fixed targets, under a dynamic target the allowable emission level is not known *ex ante*. Thus, it would be harder for policy-makers to ensure that the individual targets collectively "add up" to the national target.[35]

Monitoring and reporting. Dynamic targets entail extra information needs—namely, GDP—relative to targets based on fixed emissions levels. Thus, if GDP were used to adjust emission targets, GDP would need to be subject to monitoring, reporting, and review requirements that are analogous to GHGs.

Fortunately, the standards and methods for national income accounting (i.e., GDP and other measures) already exist. Baumert and Kim offer a comparison of the systems for estimating, reporting, and verifying GDP, on the one hand, and GHGs on the other.[36] For each system that exists to account for GHGs, one or more analogous systems for GDP accounting are already in place. For example, the System of National Accounts, created in 1952 and updated periodically, provides a common set of concepts, definitions, classifications, and accounting rules for measuring GDP and related macroeconomic variables such as inflation. Although these systems need not be duplicated by the Climate Convention, some of them may need to be integrated or recognized in some formal way.

The main challenge for governments is *implementing* and *adhering* to the existing measurement and reporting standards. The "Milestone Assessments" of the System of National Accounts show that some countries are not reporting GDP data at all, and others are doing so incompletely.[37] Likewise, only 52 countries (32 from Annex I) subscribe to the IMF's Special Data Dissemination Standard.[38]

To improve the estimation, verification, and reporting of GDP, governments would need a national accounting system that adheres to internationally accepted measurement and reporting standards. This will require skilled staff with competitive salaries and a political commitment to increased fiscal transparency and accountability. The IMF's General Data Dissemination Standard can assist countries in this regard by providing a statistical framework for national accounts as well as education and training programs. Such a system must also be operated by competent statistical or economic bodies that are functionally independent and free of political influence. For example, there are widely reported suspicions that China overstates its economic growth—typically reported as 7% or more per year—in order to promote foreign direct investment.[39]

Overall, if a country were to adopt a dynamic target, better reporting and independent verification (for which guidelines and institutions already exist) would be required for both emissions *and* GDP. This suggests the need for improved reporting and data collection capacity should the use of dynamic targets be advanced.

Targets with Price Cap

Emission targets can be coupled with a price cap.[40] A price cap places an upward limit on the costs of emission reductions, thereby providing greater up-front certainty about the potential magnitude of implementation costs for a given target. If abatement costs exceed the cap (e.g., $100 per ton of CO_2), a central authority may issue additional emission allowances, rather than requiring more costly emission reductions. In such an instance, using the price cap would allow greenhouse gases to exceed the target level.

Generally, the institutional needs associated with this form of a commitment would be similar to a Kyoto-style commitment. However, price caps, like dynamic targets, would entail a learning process for many delegations that may not be familiar with such a mechanism. With respect to implementation, there could also be important capacity implications. There are at least two options for implementing the price cap.

1. Each participating government would implement the price cap at the *domestic* level, issuing supplementary permits at the agreed international price.[41]
2. Governments (or domestic regulated sources, if authorized) could freely purchase supplementary allowances from a single authorized *international* entity.

Added institutional requirements would be needed under the first option in particular, since a domestic body is charged with administering the price cap. Governments participating in the international emission market would each need to designate a national authority to serve this function. This authority would need to be built into the same legal and regulatory framework in place to control domestic emission levels. Governments issuing supplementary permits would also have an international reporting requirement and be subject to oversight to ensure proper implementation of the price cap. Thus, overall, capacity considerations suggest vesting any future price cap permit-issuer at the international rather than the domestic level.[42]

It is worth stressing that a price cap is a market institution. As such, the likelihood that it will fulfill its intended purpose again depends on a properly functioning domestic trading system. As described above, a well-functioning emission market presupposes effective monitoring and enforcement as well as properly aligned economic incentives that favor competition and cost minimization. These conditions may not always hold, and even mature industrialized countries with strong regulatory regimes have not always been successful in regulating financial markets or in establishing markets for intangibles like emission allowances, water rights, and electricity.[43] Thus, in the absence of a well-functioning emission market that seeks out low-cost reductions, it is conceivable that some countries might avail themselves of a convenient price cap option, despite the theoretical availability of lower cost domestic reductions.

Participation Issues

The overall number of countries adopting particular commitments will have major implications for overall capacity needs of the regime. As such, the participation level in various forms of commitments is an important cross-cutting capacity consideration. Figure 4 shows indicative relationships between capacity needs and levels of participation.

Figure 4 Indicative relationship levels of participation and system capacity needs

Relative Capacity Need	Level of Participation
More Need	1. Full global participation in legally binding commitments 2. Legally binding commitments for Annex I and some non-Annex I 3. Legally binding commitments for Annex I and non-binding commitments (at least as the next step) for key developing countries
Less Need	4. No increase in participation relative to current levels

Many proposals for future commitments under the Climate Convention call for allocating emission targets *globally*.[44] If interpreted literally, these proposals call for legally binding fixed targets for *all* countries of the world. Although theoretically elegant, implementing a truly global allocation approach would necessitate a massive effort to build the relevant capacity for proper greenhouse gas accounting systems and domestic policy implementation.

Fortunately, it is not necessary to include all (or even most) countries in a formal emission control system. For instance, all the 48 countries categorized as "least developed" by the UN amount to a mere 0.5% of global carbon emissions.[45] Thus, while *wider* participation is necessary to protect the climate, establishing a system of emission targets and trading for *all* countries is not environmentally necessary to achieve the objective of the Climate Convention, and it may not be practically achievable in the near future.

If global participation is not feasible, one alternative would be for countries to adopt a particular criterion (or multiple criteria) for determining which countries would be required to take on additional commitments (i.e., a trigger, or graduation provision; see Gupta, this volume). For example, the 1987 Montreal Protocol includes different schedules for phasing out ozone-depleting substances based on a country's per capita consumption of certain controlled substances (0.3 kilograms per person). An advantage of this approach is that such criteria could be explicitly oriented, at least in part, toward capacity concerns.

Thus, those countries that have greater capabilities might be asked to take on commitments sooner, or in greater magnitude. One or more indicators might be fashioned to serve as proxies for capacity. For example, GDP per capita (measured in purchasing power parity) is often advanced as a proxy for administrative, technical, and financial capabilities (see Gupta, this volume). Other indicators relevant to poverty, education, health, and institutional capacity etc., (e.g., the UNDP's Human Development Index) might also be worthy of exploration.[46]

Conclusion

When considering the evolution of the climate regime, governments and observers must take many factors into account, including equity, economic efficiency, environmental effectiveness, and uncertainties. In addition, understanding the capacity needs of countries in adopting and successfully implementing climate commitments will also be an important element in deciding which option(s) for future commitments are the most attractive for the international community.

Adequate capacity is not necessarily a prerequisite to the adoption of future commitments. Indeed, experience under the Convention and Protocol suggests that capacity is often built *after* commitments are

adopted. But history also shows that capacities tend to develop in a stepwise manner, based on a growth in awareness and commitment to policy formulation, as well as a logical increase in technical expertise. Many options discussed above would require significant changes in behavior and implementation of new practices and procedures at the country level. For some countries, especially developing ones, the implied changes would require skipping over critical steps in the learning process. Effective implementation of certain commitments would thus be difficult or impossible, especially within the relatively short time period before the second commitment period, given the long time often needed to build capacity.

Industrialized countries have, and will continue to have, the more ambitious commitments under the Climate Convention and Kyoto Protocol. They will need to continue to set the pace with respect to developing the capabilities needed to comply with these commitments. Further, industrialized countries—particularly the United States and European Union—will need to factor considerations of capacity needs into their negotiating strategies. This requires recognition that different forms of commitment entail different capacity needs, and that developing countries should be encouraged in the negotiations to adopt only those commitments that they can reasonably implement and comply with; i.e., commitments commensurate with realistic prospects for strengthening existing capacities.

While deepening their own commitments and capacities, industrialized countries can and should help developing countries increase their capability to participate effectively in the global climate regime. Indeed, the Climate Convention calls on industrialized countries to provide the necessary financial and technical support to meet Convention obligations (Articles 4.3, 4.5, and 4.7). The United States and the European Union, in particular, need to factor considerations of capacity needs into their assistance programs. This means working through existing multilateral processes to strengthen capacity. The UNFCCC and its financial mechanism—the Global Environment Facility—have already developed more than a decade of experience building capacity in areas like monitoring and reporting. They have also identified priority areas for capacity building in most regions. Likewise, UN agencies, the World Bank, and others have substantial programs to build climate-related capacity. Bilateral efforts made by the US and the European Union should build on existing experiences under the Convention and support broader multilateral efforts.

At the same time, it must be said that financial and technical assistance from the North is not a sufficient condition to ensure capacity development in the South. Developing countries already have clear commitments under the Convention, and not all countries are fulfilling those obligations. In fact, several major developing countries have yet to submit an initial National Communication more than a decade after the adoption of the Climate Convention, despite financial and technical assistance. Capacity development is an evolving process with its own logic that depends on specific national circumstances. It involves building and strengthening institutions, something that money and technical assistance alone cannot accomplish. Ultimately, it is the internal responsibility of each country to ensure that capacity is durable and institutionalized, designed to accomplish repeated objectives and fulfill on-going commitments. Progress from major developing countries in this area would likely increase the willingness of industrialized countries to provide future assistance.

It is in the interest of both North and South to agree on a focused capacity development agenda, which both sides actually implement according to their differentiated roles and responsibilities. In the absence of such a working contract, a regime which needs continuous strengthening might only be weakened through non-compliance.

Notes

1. The authors wish to thank the OECD and IEA for their support for this work in the context of the Annex I Expert Group. The opinions expressed herein are those of the authors alone.

2. Article 3.1 uses the term "capability." Capability and capacity are functionally synonymous.

3. UNDP, *Capacity Assessment and Development in a Systems and Strategic Management Context*, Technical Advisory Paper No. 3 (New York: UNDP Management Development and Governance Division, 1998).

4. E. Brown Weiss and H.K. Jacobson, *Engaging Countries: Strengthening Compliance with International Environmental Accords* (Cambridge: The MIT Press, 1998).

5. R. Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet*, rev. ed. (Cambridge: Harvard University Press, 1998).

6. UNDP, *Capacity Assessment*.

7. See, e.g., UNDP, *Capacity Assessment*.

8. See D. Bouille and O. Gerardin, "Learning from the Argentine Voluntary Commitment," in *Building on the Kyoto Protocol: Options for Protecting the Climate*, eds. K.A. Baumert et al. (Washington, DC: World Resources Institute, 2002).

9. J. Gupta, *On Behalf of My Delegation: A Survival Guide for Climate Change Negotiators of Developing Countries* (Winnipeg, Canada: Center for Sustainable Development in the Americas and International Institute for Sustainable Development, 2001).

10. A.H. Zakri et al., "Country Capacity Development Needs and Priorities: Regional Report for Asia and the Pacific," A report of the Capacity Development Initiative, UNDP-GEF, 2000, pp.39-40.

11. Bouille and Gerardin, "Learning from the Argentine Voluntary Commitment," p.139.

12. C. Figueres and H. Olivas, "Evolution of National Authorities for the CDM," in *Establishing National Authorities for the CDM*, ed. C. Figueres (Winnipeg, Canada: Center for Sustainable Development in the Americas and International Institute for Sustainable Development, 2002).

13. E.H. Bucher et al., "Country Capacity Development Needs and Priorities: Regional Report for Latin America and the Caribbean," A report of the Capacity Development Initiative, UNDP-GEF, 2000, p. 84.

14. H. Olivas, "Establishing National Authorities," in *Establishing National Authorities for the CDM*, ed. C. Figueres (Winnipeg, Canada: Center for Sustainable Development in the Americas and International Institute for Sustainable Development, 2002).

15. R. Greenspan Bell, "Monitoring International Greenhouse Gas Emissions Trading," Analysis & Perspective, *Daily Environment Report*, BNA no.149, 2002.

16. See e.g., A. Buchman, K. Baumert, and F. Rizzo, *Complying with the Kyoto Protocol Requirements: Capacity Needs in Central and Eastern Europe* (Szentendre, Hungary: Regional Environmental Center and World Resources Institute, 2001); Greenspan Bell, "Monitoring International Greenhouse Gas Emissions Trading."

17. UNFCCC, *Review of the implementation of commitments and of other provisions of the Convention. UNFCCC guidelines on reporting and review*, FCCC/CP/1999/7.

18. UNFCCC, *Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol. Addendum. Part two: Action taken by the Conference of the Parties. Volume III*, (Decision 20/CP.7) FCCC/CP/2001/13/Add.3.

19. OECD, *National Systems for Flexible Mechanisms: Implementation Issues in Countries with Economies in Transition*, Workshop Report, OECD/IEA/IETA Information Paper, COM/ENV/EPOC/IEA/SLT (2002)4, (Paris: OECD, 2002); Buchman, Baumert, and Rizzo, *Complying with the Kyoto Protocol Requirements*.

20. See e.g., K.A. Baumert et al., eds., *Building on the Kyoto Protocol: Options for Protecting the Climate* (Washington, DC: World Resources Institute, 2002); IEA (International Energy Agency), *Beyond Kyoto: Energy Dynamics and Climate Stabilization* (Paris: OECD/IEA, 2002).

21. H. Winkler et al., "Sustainable Development Policies and Measures: Starting from Development to Tackle Climate Change," in *Building on the Kyoto Protocol: Options for Protecting the Climate*, eds. K.A. Baumert et al. (Washington, DC: World Resources Institute, 2002). *Harmonized* policies and measures could in principle form the basis of an international agreement. This option, however, has shown little potential for international support.

22. T. Morita and J. Robinson et al., "Greenhouse Gas Emission Mitigation Scenarios and Implications," in *Climate Change 2001: Mitigation*. Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, eds. B. Metz et al. (Cambridge: Cambridge University Press, 2001), p.142.

23. Although all international treaty commitments can be considered legally-binding, some commitments may be couched in aspirational rather than mandatory terms and lack an accompanying system of enforcement. For a discussion, see Baumert et al., eds., *Building on the Kyoto Protocol*, pp.11-13.

24. J. Samaniego and C. Figueres, "A Sector-Based Clean Development Mechanism," in *Building on the Kyoto Protocol: Options for Protecting the Climate*, eds. K.A. Baumert et al. (Washington, DC: World Resources Institute, 2002).

25. K.A. Baumert, R. Bhandari, and N. Kete, "What Might A Developing Country Climate Commitment Look Like?" (Washington, DC: World Resources Institute, 1999); W. Pizer, "Choosing Price or Quantity Controls for Greenhouse Gases," *Climate Issues Brief* No. 17 (Washington, DC: Resources for the Future, 1999); D. Victor, *The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming* (Princeton: Princeton University Press, 2001).

26. Bouille and Gerardin, "Learning from the Argentine Voluntary Commitment."

27. UNFCCC, *Review of the implementation of commitments*.

28. Baumert et al., eds., *Building on the Kyoto Protocol*; C. Philibert and J. Pershing, "Considering the Options: Climate Targets for All Countries," *Climate Policy* 1, no. 2 (2001), pp.211-227.

29. Y-G. Kim and K.A. Baumert, "Reducing Uncertainty through Dual Intensity Targets," in *Building on the Kyoto Protocol: Options for Protecting the Climate*, eds. K.A. Baumert et al. (Washington, DC: World Resources Institute, 2002).

30. J. Depledge, "Continuing Kyoto: Extending Absolute Emission Caps to Developing Countries," in *Building on the Kyoto Protocol: Options for Protecting the Climate*, eds. K.A. Baumert et al. (Washington, DC: World Resources Institute, 2002), p.53.

31. Increased complexity of the international negotiation process may have systemic implications beyond the scope of this paper. For a brief discussion, see Baumert et al., eds., *Building on the Kyoto Protocol*, pp. 228-233.

32. To make things simpler, the negotiation process might benefit from an initial agreement on several different dynamic target formulas to provide some standardization in methodologies (e.g., a few different GDP coefficients, *a*). See Kim and Baumert, "Reducing Uncertainty."

33. IEA, *Beyond Kyoto*; Kim and Baumert, "Reducing Uncertainty."

34. An alternative option would be for governments to allocate *fixed* emission limits to domestic sources, assuming a relatively conservative GDP growth. Then, governments could auction additional permits (or distribute them some other way) if national GDP growth exceeded the conservative expectations (or buy them back if growth assumptions turned out too high). Fixed targets would better enable domestic sources to interact with the international trading system, since targets would be denominated in a unit internationally recognized and tradable (i.e., units of CO_2 equivalent).

35. One approach to alleviating this last challenge would be to "fix" the dynamic target just prior to the budget period so that, in practice, the target would be implemented as a fixed target (Kim and Baumert, "Reducing Uncertainty," p.123). In the meantime, allowing the target to dynamically "float" during the period between negotiation and the commencement of the budget period (5-8 years) might still considerably reduce the economic risks of target taking.

36. Kim and Baumert, "Reducing Uncertainty."

37. UN Statistical Commission, "Milestone assessment of the implementation of the SNA 1993, by member States," Document E/CN.3/2000/3. See [http://unstats.un.org/unsd/statcom/doc00/2000-3e.pdf]. These assessments are for reporting only; they do not assess data quality. The IMF and World Bank-led Reports on the Observance of Standards and Codes (ROSCs), on the other hand, do assess the extent to which countries observe international standards. See [http://www.worldbank.org/ifa/rosc.html].

38. For a list of subscribers to the SDDS, see [http://dsbb.imf.org/subscrib.htm] (4 February 2003).

39. See, e.g., A. Waldron, "China's Economic Façade," *Washington Post*, 21 March 2002, p. A35.

40. Pizer, "Choosing Price or Quantity Controls"; D. Victor, *The Collapse of the Kyoto Protocol*; IEA, *Beyond Kyoto*. Like a carbon tax, the level of a price cap would need to be harmonized across countries.

41. IEA, *Beyond Kyoto*.

42. Manipulation by governments may be possible under the first option, since it imposes a design requirement on one aspect of policy formulation, but not other aspects. For example, governments might recycle price cap revenues back to the very entities that paid for the supplementary permits, thereby circumventing the price cap's intended purpose through domestic legislation. This, in turn, would have the unfortunate implication of loosening the collective environmental target of the treaty.

43. See, e.g., Greenspan Bell, "Monitoring International Greenhouse Gas Emissions Trading"; J. Perkaus and K. Baumert, "Risky Business: Lessons in Risk Management for an International Greenhouse Gas Emissions Market," (Washington, DC: World Resources Institute, 2001).

44. F. Toth and M. Mwandosya et al., "Decision-Making Frameworks," in *Climate Change 2001: Mitigation*, eds. B. Metz et al. (Cambridge: Cambridge University Press, 2001).

45. Author calculations.

46. K.A. Baumert et al., "Climate Convention Indicators: Indicator Framework Paper," Document supporting Climate Analysis Indicators Tool (CAIT), (Washington, DC: World Resources Institute, 2003). See [http://cait.wri.org].