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The Evolution of the CDM in a Post-2012 Climate Agreement

Christiana Figueres
Former member of the Executive Board of the Clean Development Mechanism
Charlotte Streck
Director of Climate Focus

Despite the many calls to reform the Clean Development Mechanism (CDM), its conceptual underpinnings are strong and it will most likely survive in the post-2012 climate regime. Some modifications may be considered in the short term to strengthen the effectiveness and transparency of the mechanism without modifying the Marrakech Accords. In the medium term, substantially increased mitigation efforts in developing countries may require a combination of three possible financial mechanisms: the current activity-based CDM albeit improved, a second market mechanism that would seek to improve the long term emission trends of developing countries by promoting broad-based emission reduction programs primarily in the private sector, and a third—nonmarket—financial mechanism that would provide an incentive for the adoption of policy changes leading to a low carbon path, but where emission reductions would not be used as international offsets.

Keywords: *CDM; post 2012 climate regime; carbon market mechanisms; climate finance*

The Clean Development Mechanism (CDM) describes one of the most innovative features of the Kyoto Protocol. Whether and how the CDM should continue serving the UN Framework Convention on Climate Change (UNFCCC) and which additional mechanisms could complement its mandate is the subject of this article.

The CDM involves developing countries into the compliance framework of the Protocol, while creating a global market in emission reductions that reached a value of more than EU13.64 billion in 2007 (World Bank, 2008).[1] Despite—or maybe just because of—its success, the CDM remains a mechanism in its adolescence trying to find its place in the international climate regime. Over recent months it has attracted an increasing amount of criticism questioning its environmental effectiveness, its economic efficiency, and its regulatory functioning. The discussion around the CDM is of particular relevance in the light of the expiration of Kyoto Protocol's first commitment period at the end of 2012 and climate negotiators'

Authors' Note: The authors thank Rosalind Cook, Moritz von Unger, and Alexander Vasa for their contributions and support in preparing this article. Please address correspondence to Christiana Figueres, 206 Chestnut Road, Box 10, Washington Grove, MD 20880; e-mail: christiana@figueresonline.com.

challenging attempts to define the cornerstones of a post-2012 climate treaty. Legislative activities in the United States, Europe, and around the globe are deciding at the same time on the implementation of domestic emission trading systems and potential links to the CDM. It is therefore timely to review the strengths and weaknesses of the architecture of the CDM in the light of a post-2012 international climate treaty and national emission trading regulation.

This article investigates how a post-2012 climate treaty could provide incentives for greater emission reductions in developing countries. We start by summarizing the current frustrations with the CDM and review incremental modifications that could be considered to strengthen the mechanism without requiring changes to the Marrakesh Accords.[2] In a next step we explore a potential post-2012 scenario that combines three possible financial mechanisms to promote large scale mitigation in developing countries: the activity-based CDM as we know it albeit improved, a second market mechanism that would seek to improve the long-term emission trends of developing countries, and a third nonmarket financial mechanism which would follow a scheme of payment for environmental services that are not commoditized and not used as international offsets.

CDM: Challenged by Its Success

The Intergovernmental Panel on Climate Change (IPCC) has left no doubt that there is an urgent need to scale-up climate change mitigation to levels that go far beyond that which was envisaged by the Kyoto Protocol and its flexibility mechanisms. We now know that the CDM falls decidedly short of delivering the emission reductions needed to lower the emission trajectories of developing countries in the longer term. But we argue that the CDM should be recognized as a crucial starting point in developing country efforts to contribute to global emission reductions. The permanent inflation of expectations tends to obscure the modest beginnings of the instrument. The CDM was created in 1997 by Article 12 of the Kyoto Protocol that is nothing more than a short 10-paragaph text. Parties to the Protocol have since then elaborated the full modalities and procedures for project activities and established the Executive Board (EB) as the operational decision-making body, which is assisted by various expert panels and working groups.[3] The achievements of the past 10 years cannot be underestimated: the CDM has in fact established a benchmark for a carbon market by defining the standards and processes for creating tradable emission reductions, consolidating methodologies, streamlining procedures, and reducing global mitigation costs.

Success however breeds rising expectations. As the supply of CDM projects has grown, and as the need for increased mitigation in developing countries has become clearer, stakeholders clamor for “more and better” from the CDM. The past two years in particular have seen a plethora of publications expressing frustration with

the CDM. The environmental integrity has been called into question through the vigorous debate over the additionality of reductions. Some authors claim that many registered projects would have occurred anyway (Michaelowa & Purohit, 2007; Schneider, 2007; Watanabe, 2008) while practitioners in the field and business associations complain that the Executive Board is being excessively stringent in its assessment of additionality.[4] There have been copious complaints about year-long delays in the approval of methodologies (International Emissions Trading Association [IETA], 2008), about the 1-2 year time lag in the assessment of projects (IETA, 2008; Michaelowa & Purohit, 2007),[5] and recently criticisms about the ineffectual operation of Designated Operational Entities (DOEs), which have become new bottlenecks in the functioning of the CDM (Hoogzaad, Korthuis, & Streck, 2008). Those focused on the sustainable development goal of the CDM point to the fact that the CDM has been more effective in reducing mitigation costs for industrialized countries than in contributing to sustainability in developing countries (Holm Olsen, 2007; Holm Olsen & Fenhann, 2008; Nussbaumer, 2009; Sutter & Parreño, 2007), and has done little to promote activities in developing countries toward low carbon development paths (Figueres, Haites, & Hoyt, 2005; Wara, 2007; Wara & Victor, 2008). The mechanism has failed to promote more sustainable energy production and consumption patterns and does not create any incentives to adopt more sustainable forest management practices. Finally, CDM decision making and governance is flawed as long it denies due process guarantees to nonstate actors that do not have standing under international law (Meijer, 2007; Streck & Chagas, 2008; Streck & Lin, 2008).

The CDM is unlikely to be able to address all of these issues, but there is ample room for improvement toward 2012 and evolution beyond 2013, and there has certainly been no lack of suggestions on how to change and enhance the CDM. This article does not undertake an in-depth evaluation of the multiple proposals for change. Although there are many options that are technically feasible, this article seeks to identify those modifications that may be politically acceptable to all parties, given the necessary scale of mitigation post-2012 and in the context of the short time frame available to debate a 2009 Copenhagen agreement.

Political Realities

There are three main political constellations that shape the potential consensus around a future climate deal. First, since its rejection of the Kyoto Protocol in 2001 the United States (until recently the largest national source of CO2 emissions[6] and by all counts the most historically responsible) has not attached any priority to international climate negotiations. Neither has the United States participated in the implementation of the CDM nor any other mechanisms created by the Kyoto Protocol. The administration of President Obama has assumed a more proactive position, and the expectation is that the United States would soon undertake efforts

that are comparable with other industrialized nations. The political will has been established by the new leadership, but the procedural necessities will take time. Even with all good will, the United States is likely to seek agreement on domestic emissions regulation before it decides to enter into a multilateral agreement and this is unlikely to occur by December 2009.[7] The consequence for the international agreement could be that Copenhagen agreement, in close consultation with the U.S. team, may have to be crafted as an architectural "docking station" where the major architectural design is set for the United States to later "dock in". Although the details of how the next chapter of the regime will operate will not emerge from the Copenhagen meeting, the basic architecture of the agreement (reduction targets and timetables for industrialized countries, nature of the participation of developing countries, market structure, existence of a nonmarket financial mechanism, etc.) will have to be one that the United States can agree to in principle and can join as soon as domestic legislation is in place.

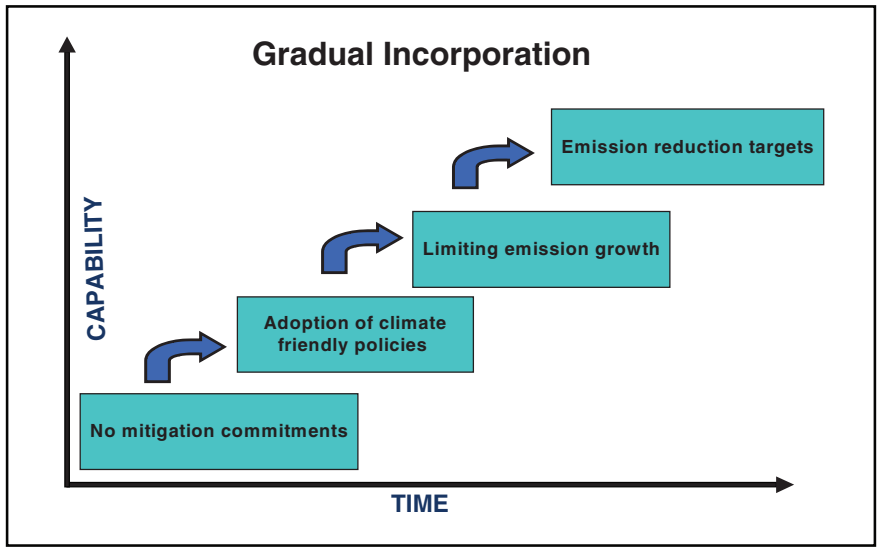
The second political reality is that among the industrialized nations only the EU has been clear about its intended post-2012 mitigation level. Unlike the United States where international commitments tend to follow domestic policies, the EU has had a practice of defining international targets first and leaving it to Community and member-state legislation to define the policies on how to attain these targets later. Although the EU has been careful to differentiate its unilateral mitigation commitment (20% below 1990 levels by 2020) from an additional 10% reduction in case of a satisfactory—from the point of view of the EU—international agreement),[8] it is not guaranteed that member states would be willing to uphold the unilateral reduction level in the event of a failed or unsatisfactory international agreement.

The third political constellation is that of developing countries. These countries understand that the reduction in GHG emissions needed to avoid catastrophic climate disruptions cannot be attained by industrialized countries alone, even if those reductions reach 80% or 90% below 1990 levels. However, developing countries' contribution to global mitigation must consider that.

Following the principle of common but differentiated responsibilities and taking into account the different social and economic conditions of parties to the UNFCCC,[9] developing countries expect industrialized nations to take the lead in assuming emission reduction commitments. They are likely to only commit to significant and internationally recorded mitigation action if industrialized countries (including United States, Japan, Canada and Australia) have demonstrably taken the lead.

Developing countries are very diverse with great disparity in economic power, with direct bearing on both responsibility[10] as well as capability[11] to mitigate. A few emerging economies have felt the pressure to contribute to mitigation efforts in the near term due to their current rapidly increasing emission levels and growing economic development levels. China, India, Korea, Mexico, Brazil and South Africa have all come forward with first estimates of their mitigation potential.[12] Beyond these, there is a group of middle income developing countries that are not considered

Figure 1
A Possible Scheme for Gradual Incorporation of Developing Countries



Source: Figueres (2007b).

large emitters in absolute terms, but whose growth patterns could lead them, under a business as usual scenario, to relatively high GDP and emission levels over the next 20 years (e.g., Chile, Argentina, Malaysia, Iran, Saudi Arabia, etc). Finally, the largest number of developing countries is comprised of small economies whose emissions are negligible now and in the foreseeable future. They may continue to contribute to mitigation efforts, but most likely under little international pressure to curb their emission growth.

Developing countries will not immediately enter into absolute reduction commitments but rather may sequence their nationally appropriate mitigation actions[13] to gradually move up the stringency ladder (Clémençon, 2008). The larger developing countries could start with a focus on climate-friendly development policies without explicit mitigation commitments, and transit over time, based on demonstrated responsibility (emissions) and capability (GDP per capita), to limiting emission growth and finally at some point in time, to adopting emission reduction or at least emission intensity targets (Figure 1). To uphold the integrity of the system, all mitigation efforts would have to be domestically measured and reported, and independently verified.

Recent McKinsey studies estimate that global emissions must be reduced by 17 Gt CO_2 equivalent emission reductions or 28% versus the business-as-usual scenario by 2020 to get on a path that has longterm stabilization at 450 ppm.[14] The

UNFCCC estimates a needed reduction of 25% below 2000 levels by 2030 (UN Framework Convention on Climate Change [UNFCCC], 2008). 68% of such mitigation would have to be achieved in developing countries, this would amount to costs 46% of the total global mitigation (UNFCCC, 2007). As two thirds of future emissions will come from developing countries, they could eventually provide most of the mitigation needed for stabilization, but they cannot be expected to pay for it. Financial support for substantial mitigation in developing countries is made more palatable to industrialized nations by the fact that these are the most cost effective mitigation efforts.

The financial crisis and a following may bend the emissions curve downwards leading emission reductions. The overall effect is limited unless the crisis is seen as an opportunity to reprioritize investments and channel funds into low carbon and clean technologies. The massive public spending aimed at supporting financial institutions and stimulating economic activity, will however limit the appetite and ability of industrialized countries to support developing country mitigation action. These constraints add an additional layer of complications to an already highly complex negotiation package. The limitation of resources will make it even more important to realize low cost emission reductions and promote private investments into in clean technologies. Market mechanisms may show one way on how to leverage private investments into climate change mitigation.

The conditional transfer of private resources from the industrialized countries for purposes of underwriting part of the mitigation costs in the developing world is what is at the heart of the CDM and will likely continue to be the modus operandi of the financial mechanism(s) that may be devised for post-2012 mitigation.

Scaling Up Emission Reductions in Developing Countries

One of the main challenges of a post-2012 agreement is thus to define a framework which creates incentives for developing countries to reduce emissions beyond those currently mobilized by the CDM. Challenges of scaling up the current CDM to access broader emission reductions include the following:

Environmental integrity. Strict checks on the environmental credibility of a particular activity is particularly important in the CDM where emission reductions are used as offsets, thus not leading to an overall reduction but only to a displacement of the emission reductions to a source of more cost efficient GHG emissions abatement. The current CDM is based on activity-based crediting that is supported by rigorous checks and balances to ensure that emission reductions are additional, and that any emission reductions are correctly monitored and verified. The environmental integrity of any and all future market mechanism(s) must be upheld.

Uncertainty over demand. As with any market, the carbon market is based on the notion of scarcity. Incentives to innovate, seek low cost emission reduction options and invest in relevant technology are dependent on an environment where the circulating number of allowances and credits are below the actual level of emissions. To ensure

that credits remain scarce and prices high, the design of emission trading schemes normally involve limitations for the import of credits. To protect the EU Emission Trading Scheme from the flooding of CDM credits, for example, the market regulator has capped the number of Certified Emission Reductions (CERs) from the CDM authorized for transfer.[15] Any future market mechanism must have appropriate demand as a key design feature.

Market versus nonmarket. The post-2012 international climate agreement will probably have to rely on a mix of market and nonmarket-based mechanisms. The carbon market so far has proven to be a successful way to involve private entities in treaty compliance, but has yet to be tested as a means to generate public finance. Carbon finance and the private sector contributions to a future climate regime are essential to mobilize the required scale of funding. Market-based mechanism have to be completed however with public funds that provide governments with stable resources to adopt and implement policies and programs that lead to GHG emission reductions.[16]

Without minimizing the need for more effectiveness, it is probably not realistic to attain anything more than incremental changes to the CDM during the current commitment period (before 2013). Although practitioners clamor for significant improvements, their opinion is of little influence in the international process and institutional learning is slow. Many countries are still learning the ropes of the instrument, and others are more focused on the new agreement and the tools for scaling up post-2012 mitigation. Thus in a possible evolution, it may be helpful to distinguish among three levels of improvements/changes to the current CDM, which would ultimately result in three financial mechanisms, functioning in parallel and in a complementary manner to one another:

The activity-based CDM. Under the current CDM both projects and programs can be submitted for registration, however they must be activity based. Activity-based means that the emission reductions must be directly traceable to a specific and concrete mitigation activity. Assuming the CDM will continue to operate within the general bounds of the Marrakesh Accords[17] at least until the end of the current commitment period in December 2012, there are incremental improvements that could be undertaken by the Executive Board itself, and other changes that would require a decision of the COP serving as Meeting of the Parties to the Kyoto Protocol (COP/MOP) but do not change the fundamentals of the current CDM.

A trend-changing mechanism. Given the need to scale-up mitigation in developing countries beyond what can be delivered by the CDM, it may be necessary to create a second generation of market mechanisms that allow the scaling up of the CDM focusing on impacting long-term emission trends particularly in large emerging economies. Based on the experiences of the CDM.

A nonmarket mechanism. In the post-2012 regime, it may be necessary to limit the scope of the market and create a complementary financial mechanism to promote certain mitigation efforts in developing countries without creating international offsets to keep the global reductions and timelines within the ranges demanded by science.

We discuss each of these possible mechanisms.

5.1 The Activity-Based CDM

Today's wisdom demands higher emission reduction levels than those made possible through the current activity-based CDM, and many voices have understandably joined the chorus to expand the CDM (or create another mechanism) toward sector-wide mitigation efforts. However, it is likely that the CDM may remain, at least in part, an activity-based market mechanism, now and beyond 2012. The logic of this system is based on the direct measurement of concrete mitigation activities in terms of tons reduced by individual projects rather than encouraging a shift in emission trends (Figueres, 2007a). In this system, baselines and additionality are determined at the individual project activity level.

The Marrakesh Accords flow from an activity-based logic. To change that logic, the CDM Executive Board would need a decision of the COP/MOP, and there is little political space to make such a shift before 2012.[18] Over the next 2 years, negotiators are not likely to consent to material changes particularly if they could lead to higher CERs volumes. A significant scaling up of the CDM to deliver more emission reductions will have to correspond to deeper emission cuts of industrial countries, which would only apply for the post-2012 period. Industrial and developing countries alike fear that a substantial scaling up of the CDM could open a floodgate to supply which would overwhelm demand and depress prices. This consideration has been supported in recent months by a drop in prices of allowances under the EU emission trading scheme. Although this drop relates to the current economic crisis, additional supply would further drive prices down.[19] Thus it is our sense that the CDM will not be subjected to any serious revamping during the first commitment period.

This is not to say that the CDM is a finished product. Importantly, it should incorporate several key administrative improvements and the sooner the better. In the following, we list (a) measures that could be undertaken directly by the EB without the need for a COP/MOP decision and (b) improvements of the CDM requiring a COP/MOP decision without touching the basic principles of the CDM. Any changes undertaken by the EB for the first commitment period would presumably stay in place after 2012, whereas reforms that require a more profound reform of the CDM would likely only take effect in 2013.

Improvements That Can Be Enacted by the Executive Board Itself

Delegation to the secretariat. Assuming that the level of CDM submissions continues to rise and that nominations to the Executive Board will, at least for the next three years, continue the current practice of part-time voluntary Board members who do not have regulatory experience, it is inevitable that the Board will have to delegate some of the work. The UNFCCC Secretariat has has been adding and training staff to support the various functions of the Executive Board. This trend will probably continue. The ultimate responsibility for any decision will certainly continue to reside with the Board, but some aspects of project review could be shifted even

further to the Secretariat, avoiding unnecessary delays and allowing the Executive Board to focus more on policy decisions.

Review of the EB's administrative rules. Currently, there are only a few formalized provisions governing the interaction between project proponents, the Executive Board, and its panels. Insecurities regarding communications, hearings, and time lines often make processes cumbersome and opaque. From the perspective of project participants, there are insecurities regarding communications, hearings, and time lines that often make processes cumbersome and opaque. As a result, there is an undefined period of legal and planning insecurity during which project participants have (a) to retain resources to answer an undefined and unlimited number of new questions and (b) have no indication on whether they can move ahead with developing the corresponding CDM project activities. Parties could consider the adoption of administrative due process rules governing communication amongst the various CDM actors (Streck & Lin, 2008).

To address this situation, the Executive Board may update its rules of procedure ensuring that the interaction with project participants is clearly regulated. The objective of such rules would be that any person (DOE or project participant) with a direct and material interest in any of the decisions of the Executive Board would have the right to (a) express an opinion and its reasons, (b) have that position considered, and (c) have the right to appeal (see below).

Role of designated operational entities. The functional relationship between the Executive Board and the Designated Operational Entities (DOEs) requires improvement. DOEs are charged with ensuring that any project submitted for registration meets all CDM requirements. However, the reality is that DOEs have not been performing to expectations. DOEs argue that they are understaffed and that it is difficult to find qualified people. The Executive Board argues that DOEs should learn from the published EB reports. Either way, DOEs cannot stand outside of Executive Board decisions—as the extended arm of the Executive Board, they need to be incorporated more organically into the EB decision-making process. The recent approval of a Validation and Verification Manual should be of help. However, the Executive Board reaches decisions with direct regulatory implications at every meeting and the DOEs should be the first to know and understand. Were the Executive Board to clearly state the rationale for decisions on registration and issuance, DOEs and project proponents would be able to more effectively derive the lessons learned and apply these in the preparation of future projects over time improving the performance of DOEs.

Improvements Requiring a COP/MOP Decision

The above issues could be considered directly by the EB or decided by Parties in a COP/MOP decision for the current commitment period. In addition, there are other

elements which represent more fundamental changes to the CDM which are not likely to be considered for enactment before 2013 and would necessarily have to stem from a decision of the Parties.

Professionalizing the Executive Board. The current EB has been established as a United Nations committee, rather than as a professional regulatory authority overseeing the carbon market. However, the EB is in the position of a de facto market regulator. To effectively fulfill this role, a first step in this direction would be to professionalize the EB (Streck & Lin, 2008). Presently, the majority of its members have a background in international environmental negotiations, not in market regulatory work (e.g., work experience in financial or energy regulatory authorities). As a result, the considerations of the EB tend to be oriented toward agendas raised during international negotiations rather than to the sort of issues related to the creation and maintenance of an efficient international market. The professionalization of the EB would require the recruitment of full-time salaried individuals whose collective experience spans the entire range of responsibilities (including project finance, law, business management, science) and is grounded in practical, project-level experience and knowledge of the CDM. Equipping the EB with professional staff would also help avoid conflict of interests because individuals are no longer made to serve several agendas and political interests in parallel and could devote themselves full-time to the EB.

Review mechanism. In addition, a review mechanism of the decisions of the EB could be put in place. The COP/MOP decisions foresee a review procedure of some contested decisions when a decision improperly affects a party's interest. The review is conducted by the enforcement branch of the Protocol's Compliance Committee.[20] The compliance mechanism under the Kyoto Protocol does however only apply to parties and does not extend any protections to nonparty participants in CDM projects.

The governance of the CDM is an example of the increased delegation of authority under treaties to subordinated panels and constituted bodies. In the case of the CDM, this occurs from the delegation from the COP/MOP to the CDM Executive Board. Administrative effectiveness may increase through the delegation of executive tasks to specialized bodies such as the CDM Executive Board. To the same extent, however, democratic accountability diminishes through the increasing distance from legislative bodies and ratified international instruments. A CDM appeals system would promote the principles of accountability, efficiency, and nondiscrimination in the implementation of the CDM and thus boost the legitimacy and quality of the decisions of the Executive Board (von Unger & Streck, 2009).Under the existing guidelines, procedures, and rules, the procedural rights of private parties are very limited. Affected project participants are afforded no opportunity for review of Executive Board decisions. The COP/MOP could establish an appeal mechanism that gives standing to individuals who are granted rights and obligations under the CDM and guarantees a full review of EB decisions (Streck, 2007).[21]

5.2 A Trend-Changing Market Mechanism

The reductions achieved under the Kyoto Protocol will not make a dent in global emissions, and so far has had even less of an effect on emission trajectories. The decarbonization that the current CDM is not able to achieve in developing countries needs to be aggressively pursued in the post-2012 period. Although economic growth in developing countries must continue, the efficiency of energy consumption must improve and the carbon intensity of production must swiftly decrease. Decoupling growth from emissions is the only way to pursue economic development and climate protection simultaneously, and this requires a radical shift in the policies that regulate the productive sectors.

A post-2012 climate treaty must play an important role in introducing and implementing the policy changes needed to put developing countries onto a low-emission path. It could be argued that programmatic CDM is a first step in the direction of decarbonization by stimulating climate friendly policies. Indeed, that was the original intent. Stemming from the firm conviction that the market needs to promote climate friendly policies and not just isolated projects, proponents tried to introduce the eligibility of policies and standards in the CDM during the COP/MOP negotiations held in Montreal in 2005. The idea was met with much resistance on the part of industrialized countries. Eventually, a compromise was reached, which is encapsulated in the COP/MOP-1 decision that gives rise to programmatic CDM: "A local/regional/national policy or standard cannot be considered as a clean development mechanism project activity, but project activities under a programme of activities can be registered as a single clean development mechanism project activity".[22] The decision differentiates between the existence of a policy (not eligible) and its implementation through specific activities (eligible). The adoption of initial rules governing programmatic CDM was important for opening the CDM to projects in sectors that are highly dispersed over space and time. However, programmatic CDM is still incipient and regulatory decisions are not finalized. From the regulator's perspective, the paradigm shift from single project activities to aggregate activities that implement a policy or standard and are implemented over time and space has proven to be challenging. Consequently, programmatic CDM continues to fall short of triggering the needed level of GHG emission reductions at the scale of whole economies.

The next chapter of the climate regime must be built around the active and deliberate promotion of climate friendly policies throughout the developing world. Over the past few years, many proposals have emerged suggesting options for making this shift.[23] Here we highlight the subset of proposals that revolve around concepts that focus on emission reductions in particular economic sectors of a country, as they seem to have most political attention. There are basically two groups of proposals with varying degrees of elaboration: those that stem from an agreement among industries that operate in the same sector but are located across different countries and those that evolve from a national government decision to implement a specific policy or measure within the boundaries of the country.

Industry Agreements

Arising from concerns over leakages and negative competitiveness effects associated with country-specific mitigation commitments (International Energy Agency, 2008), industry has taken the initiative to establish transnational, industry-led networks that promote climate change mitigation policies involving different sectors in developed and emerging countries alike. A key purpose is to avoid that competitiveness gains could be obtained through regulatory arbitrage, a particular concern for trade-exposed industries such as cement, aluminum, and steel, which are so energy intensive that they alone represent a significant share of emissions (Egenhofer & Fujiwara, 2008, Höhne & Ellermann, 2008). Transnational voluntary policy cooperations exist for the aluminum sector (under the auspices of the International Aluminum Institute), for the cement sector (Cement Sustainability Initiative under the auspices of World Business Council for Sustainable Development), for the iron and steel sector (administered by the International Iron and Steel Institute), and in the form of multisectoral, public/private partnerships (Asia-Pacific Partnership on Clean Development and Climate).

The private sector approach to sectoral crediting has three major flaws. First, it would need to be based on firm commitments, and yet the participation in private sector agreements is voluntary by definition. Second, even though industry today confesses wholeheartedly to the objectives of sustainable development, the level and quality of commitments taken are meager. Third, voluntary commitments by private stakeholders are by definition outside the purview of the UNFCCC process where only states can enter into international agreements. Therefore, agreements that are reached in the realm of the private sector could be complementary to, but cannot substitute agreements reached among governments within the UNFCCC process.

Government Actions

Referred to by some authors as the "policy-based approach" (Sterk & Wittneben, 2006)[24] but by others as a form of a "sectoral" approach (Bodansky, 2007, Bosi & Ellis, 2005), this approach centers on the generation of emission reductions by developing countries that adopt binding or nonbinding policies, voluntary or mandatory standards that measurably reduce GHG emissions. Under this approach originally proposed by Samaniego and Figueres (2002), developing countries would develop regional, sectoral, subsectoral, or cross-sectoral mitigation efforts, which would be the result of specific sustainable development policies, measure the attained reductions against a sector wide reference level, and sell those on the international emission reduction market. The mechanism would be comparable to the CDM but covering a whole sector rather than a particular activity.

To assign some of the cost to developing countries and increase the net gain to the climate by not converting all reductions into offsets, some authors have evolved the above concept toward Sectoral No-Lose Targets (SNLTs). Under SNLTs, developing countries would voluntarily propose a crediting baseline over a commitment or "management" period of time that would be below the business

as usual projection and be negotiated internationally. The country would reach the crediting baseline through domestic efforts and would then be allowed to sell any surplus emission reductions that are achieved beyond the crediting baseline but carry no penalty for not achieving that baseline. The difference between the reference level and the crediting baseline would represent the country's own contribution to mitigating climate change.

Proponents of the SNLT mechanism propose that crediting baselines be negotiated at the same time as Annex I country targets for post-2012. A SNLT mechanism would not require proof of the additionality of particular policy interventions or activities. SNLTs make sense for larger developing countries with a stable investment climate that seeks to significantly scale-up private sector investment according to their sustainable development priorities and where current carbon market policy tools, such as the various forms of CDM, are not considered adequate to the task (Ward et al., 2008). The aggregation of revenue potential could provide financial leverage sufficient to transform the sector over a 10-20 year period. Although emerging economies may benefit from SNLT, they will be careful to not accept any target that would operate as a cap on development. Developing countries will also vehemently avoid any mechanism that is perceived as a backdoor strategy to push them into binding national targets.

As an alternative, some countries have introduced the concept of crediting on the basis of "nationally appropriate mitigation actions", a term which is yet to be defined but which could include regional or (sub)sectoral mitigation efforts stemming from the measurable implementation of specific sustainable development policies, such as energy efficiency standards.

The crediting approaches that go beyond single projects open an avenue for a financial mechanism that can complement current CDM practices and help to take mitigation efforts to scale. To be successfully implemented, the expanded mechanism would require major alterations to the international carbon market as we know it, if only to safeguard the integrity of a system that will trigger mitigation efforts at a scale heretofore unknown. Taking into account the risk of driving emission reduction prices down by enabling high supply levels, the comparative advantages of market based against nonmarket-based mechanism will have to be carefully assessed. The supply of credits from expanded crediting mechanisms would have to be matched by deeper reduction targets on the part of and increased demand from Annex I countries. Parties would decide whether this new market channel is created inside the CDM under the guidance of the EB (but with modalities different from those of Marrakesh), or whether it should have a separate structure and more sophisticated regulating body.

In any case, the following issues would need to be addressed:

At the mitigation level, the logic of the system needs to evolve from focusing on the project activity to focusing on the policy that spurs the emission reductions.

Decarbonization will simply not occur without the necessary regulatory framework. Only regulatory certainty will stimulate an adequate and reliable new source of risk capital to finance technology shifts on the scale of whole economies. In addition to promoting activity-based emission reductions as in the traditional CDM, the next (or expanded) emission reduction mechanism must promote the necessary sector-wide transformation attained by cost effectively channeling capital and know-how to decarbonise carbon intensive sectors such as energy, transport, and infrastructure (Figueres & Newcombe, 2007).

At the financing level, mitigation action needs to be appropriately rewarded reflecting the different strengths and constraints of private versus public financing. The conditions under which the private sector adopted the CDM as an international incentive mechanism include (a) low exposure to host country risk, which in the CDM is limited to the issuance of a letter of approval on the part of the host government, (b) ability to control project risk and independence of carbon credit allocation to an individual project from broader policy failure, and (c) despite all flaws, trust that the international governance structure will reward emission reductions with tradable carbon credits. Governments on the other hand rarely act as carbon speculators. They are unlikely to create budget lines on the basis of a future promise of carbon credits unless they receive a price guarantee and assurance that credits will actually be issued. Trading of carbon credits by governments, even if they come in the form of allocated allowances as in the case of Assigned Amount Units, raises issues related to state budget rules, sale of state assets, ownership of emission rights, constitutional limitations, predictability of funding, and allocation of proceeds.[25] As a result, the sale of AAUs from these countries has been very limited. Turf battles among ministries and questions on a fair price of carbon have further paralyzed the sale of carbon credits on the state level. Lessons learned from this process could help in designing a post-2012 incentive system that takes into account the need for stable and predictable funding of government agencies.

At the crediting level, governments could have the right to propose expanded crediting schemes involving tradable carbon credits or opt for other negotiated and determined incentives (e.g., cash, loans, guarantees). Performance could be measured against an agreed and adopted reference level, a performance benchmark, an SNLT or any other performance indicator. The mechanism could foresee the allocation of tradable carbon credits based on a reduction of emissions below a certain baseline. To reduce the price risk, governments could negotiate the sale of the credits in advance against a fixed price per ton of CO2e emissions reduced. Annex I Governments would have to decide whether they will open private carbon markets to these credits; if not, other off take agreements would be needed to give developing countries the assurance that there is demand for emission reductions. Alternatively, governments could also opt not to receive tradable carbon credits and negotiate a cash-based reward system. A private sector crediting scheme, a CDM-like mechanism, could be integrated into a system of public finance to attract private sector financing against the reward of tradable carbon credits. Double counting would have to be eliminated by deducting emission reductions that form part of an activity-based crediting mechanism from government achievements.

At the administrative level, an international regulatory body would have to administer the mechanism and any agreements concluded/programs approved. To ensure consistency among various mechanisms, the mandate of such regulatory body—either a reformed Executive Board or a newly constituted body—could include the management and supervision of an expanded, sectoral crediting mechanism. This body would have to be composed of professional regulators who understand and have expertise in the relevant sector. Technical experience should therefore be the governing criterion for the selection of relevant experts.

The participation of private sector entities in an expanded crediting mechanism would require the establishment of administrative procedures that ensure a transparent, legitimate, and fair process. This would imply the establishment of a due process based on administrative procedures on the international and relevant laws on the national level. Where carbon crediting takes place on the government level, laws would have to ensure that rights to emission reductions from a particular actor or activity are transferred to governments and that the initial holders of emission rights are duly compensated.

5.3 A Nonmarket Mechanism

Although the CDM has proven to be an effective vehicle for stimulating investment into emission reductions in developing countries, it encapsulates the major flaw of creating offsets that are used to cover emissions elsewhere and hence do not contribute to limiting/reducing overall global emissions. The negotiated set of post-2012 financing mechanisms should therefore not rely on offsetting emissions alone; a nonmarket mechanism is proposed to scale-up mitigation efforts.

Although during the first commitment period demand and supply seem to be approximately in balance, in the post-2012 period supply may technically dwarf demand. The demand for emission reductions by 2020 will depend on the agreed emission reductions by developed countries, but the UNFCCC does not estimate a demand of more than 1.7 GtCO2 annually, given the expected reduction levels from those countries (UNFCCC, 2008). The same paper assesses the abatement potential of the developing world at approximately 5 Gtons by 2030 in sectors currently eligible under the CDM, plus an additional potential of at least 1.6 Gtons in reductions of emissions from deforestation and forest degradation (REDD; UNFCCC, 2008) that are not included in the current CDM. Obviously the full technical abatement potential will not be realized, but the mere order of magnitude evidences the striking imbalance between low demand from industrialized countries and much greater potential supply on the part of developing countries for the post-2012 period. Thus the limited demand for offsets dictates a necessary restriction to the supply of carbon credits and the definition of alternative finance mechanisms.

A nonmarket financial mechanism could be created to reward policy efforts and emission reductions without creating tradable carbon credits. In principle, the

concept is not much different from the Sustainable Development Policies and Measures (SD-PAM) proposal originally suggested by Baumert and Winkler (2005), except that in this case, emission reductions need to be measurable and verifiable. SD PAMs backcast from the desired future state of development and define more sustainable (i.e., lower emission) pathways to meet those development objectives. The focus is on large-scale policies and measures, not individual projects. Developed countries would support the voluntary efforts of developing countries, both financially and through technology transfers but not on the basis of the purchase of offsets.

Developing countries that engage in efforts to reduce emissions have to evaluate and modify traditional development policies so as to incorporate the climate impact. Developing countries would have to adopt policies that do not mimic the development path of industrialized nations but rather lead to low emission growth. Robust incentives for emission reductions are a condition for developing countries to undertake these efforts to transform development policies. An appropriate incentive framework must make knowledge and expertise available to participating tropical countries and financially compensate them for their efforts and resulting emission reductions. Funds need to be adequate, predictable, and sustainable. Although voluntary contributions, in particular if financed through the auctioning of domestic allowances, can be significant, funding would be exposed to budgetary considerations and national policy priorities. Funding for international climate mitigation would have to compete not only with other international funding priorities but also with domestic needs. The advantage of funding via Annex I voluntary contributions is that funding may be available fast and bridge the funding gap until more stable and robust financing options are in place. The details of the mechanism will have to be answered by the international negotiations. However, industrialized countries could be reassured by the fact that any distribution of funds would be success based, rewarding only those emission reductions that have actually occurred, as confirmed by measurement, reporting, and verification.

Conclusion

The gradual and incremental approach that has been outlined above is the "path of least resistance" to the next iteration of financial mechanisms for long-term (2013 and beyond) mitigation. As we continue with the international negotiations for the future climate regime, options that can be agreed to by all nations are constrained by the current political constellation. Although some industrialized countries have been actively engaged in mitigation efforts over the past 10 years, others with even more responsibility have been remarkably absent. The science requires both groups to reach a level of comparable effort of deep reductions and to do so in a timely manner. Developing countries are united in their expectations of leadership on the part of

industrialized countries but are differentiated in terms of their own capacity to contribute to the solution. At a time in which rapidly emerging countries are focused on economic growth, emerging scientific understanding requires them to initiate efforts to move away from uncontrolled emissions and to soon impose some type of emission-growth restrictions. However, neither the North nor the South is racing to meet the requirements of science. Entrenched in their traditional defensive positions that reflect a deep lack of trust of the other side, both sides are currently only willing to contribute to a solution that represents the minimum common denominator and is at best gradual and incremental.

There is however one factor that could substantially alter governments' positions and that is the global financial crisis. A traditional interpretation of the crisis would foresee even less engagement on climate given the dwindling availability of capital. Ironically, it is also possible that this is precisely the pressure that is needed to radically shift the nature of growth.

The low-carbon agenda can act as an engine for job creation and economic recovery while at the same time increasing energy and climate security. Major economies face the opportunity to make a strategic investment that dramatically improves efficiency in buildings and power, and to replace 19th-century technologies that depend on carbon-based fuels with 21st-century technologies that use renewable fuels, all as part of a concerted effort to revive and redirect the economy. The group of major economies includes the larger developing countries. The challenge of solving the climate crisis could move us into the realization that we now live in a multipolar world, where solutions cannot be implemented only by a few. The recent London Summit of the G20 is a first evidence of what could be a profound shift in global power and influence. A new world order that incorporates emerging economies into the solutions group, albeit gradually, is a sound harbinger of a durable development framework.

Notes

1. EUR 12 billion according to Røine, Tvinnereim, & Hasselknippe, (2008).

2. The Marrakesh Accords were adopted in 2001 at the 7th Conference of the Parties to the UNFCCC and confirmed by the 1st Meeting of the Parties of the Kyoto Protocol in 2005. They contain the implementation guidelines for the Kyoto Protocol. Decisions 1-19/CP7 reflected in decisions 2-13/CMP.1

3. For a description of all panels, working groups, and teams see http://cdm.unfccc.int/Panels/index.html. For a list of operational entities see http://cdm.unfccc.int/DOE/list/index.html.

4. In particular, for its use of investment analysis as a litmus test (IETA, 2008; UNFCCC, 2007a): *Call for Input on Non-Binding Best-Practice Examples on the Demonstration of Additionality to Assist the Development of PDDs, Particularly for SSC Project Activities*. Some of the comments prove the dissatisfaction with the additionality tool.

5. The average time for the Executive Board to finally approve or reject a new methodology amounts to an average 305 days; it takes an average of 409 days from the submission to validation of project to the registration of that project. From these 409 days, 281 are consumed by the validation (and account for the time needed by Designated Operational Entities to validate the project design of a project), the remainder by the registration.

6. China is believed to have overtaken the United States in absolute national terms during 2006; see Gregg, Andres, and Marland (2008).

7. On March 31, 2009, a discussion-draft titled "The American Clean Energy and Security Act" proposing a federal cap-and-trade scheme in the United States was released by Chairman Henry A. Waxman of the Energy and Commerce Committee and Chairman Edward J. Markey of the Energy and Environment Subcommittee.

8. The EU climate goal forms part of an energy and climate strategic package presented by the EU Commission on January 23, 2008, and endorsed by the Council on December 4 and the European Parliament on December 13, 2008. The reference line for reductions has been defined as 2005, as opposed to the previous 1990 levels, because of resistance of some member states. The Commission proposal is available at http://ec.europa.eu/environment/climat/emission/ets_post2012_en.htm.

9. These principles, as well as recognition of different national circumstances and capabilities, are enshrined in the preamble to the UNFCCC.

10. Responsibility could be proxied as either cumulative emissions or annual emissions, and either could be measured on a per capita basis.

11. Capability could be proxied as either GDP or GDP per capita.

12. For China's mitigation proposal, see Pew Center for Climate Change, Climate Change Mitigation Measures in the People's Republic of China, International Brief April 1, 2007. For Mexico's proposal see Estrategia Nacional de Cambio Climático, Secretaria de Medio Ambiente y Recursos Naturales, Mexico, 2007. For India's proposal see http://www.pewclimate.org/international/country-policies/india-climate-plan-summary/06-2008. For South Africa's proposal see Scenario Building Team, 2007, Long-Term Mitigation Scenarios: Strategic Options for South Africa, Department of Environment Affairs and Tourism, Pretoria, October 2007. For Brazil's proposal see National Plan on Climate Change, Interministerial Committee on Climate Change, Brasilia, Brazil, Decree No. 6263 of November 21, 2007.

13. The Bali Action Plan, Decision 1/CP13 envisages "[n]ationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building in measurable, reportable and verifiable manner."

14. Quoted in The Princes Rainforest Project, An Emergency Package For Tropical Forests, March, 2009, (http://www.princesrainforestsproject.org/news-and-articles/rainforest-news/5-news-and-articles/728-emergency-package-for-tropical-forests. The assumed mitigation path peaks at 510 ppm in 2080-90 and reaches 450 ppm by 2200 (Meinshausen et al., 2006).

15. Directive 2004/101/EC of the European Parliament and the Council of October 27, 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.

16. Such funds can be mobilized via voluntary contributions from industrialized countries. Several countries, including EU member states and the United States are considering the earmarking of the proceeds from auctioning of domestic allowances for international climate mitigation. In addition, there are several proposals on how to raise funds internationally, for example, via the auctioning of Assigned Amount Units or levying international fees and taxes (UNFCCC, 2008).

17. Decision 17/CP 7 as adopted by COP/MOP 1 as Decision 3 CMP 1.

18. Substantial changes to the CMD which were discussed under Article 9 negotiations at COP/MOP 4 in Poznan did not prosper and were deleted from the text even before the entire Article 9 was dropped.

19. EU allowance prices are listed on the Web site of the European Climate Exchange (http://www.ecx.eu/). One problem of current emission trading systems, including the EU Emission Trading System, is an inelasticity of supply based on fixed ex-ante allocations in an environment unpredictable demand (influenced by economic cycles, weather, CDM supply, etc).

20. Decision 27/CMP.1, Annex, procedures, and mechanisms relating to compliance under the Kyoto Protocol, sections IX and X.

21. An alternative remedy has been proposed by E. Meijer under which decisions of the EB would be open for review by national courts (Meijer, 2007).

22. Paragraph 20, Decision2/CMP 1.

23. Cosbey et al. (2005) described 44 proposals which have been made within and outside of formal UNFCCC processes and additional ones have emerged since then.

24. Bosi and Ellis (2005 p.6) analysed as an option policy-based crediting.

25. The World Bank (2006), on regulatory and legal matters.

References

Baumert, K., & Winkler, H. (2005). SD-PAMs and international climate agreements. In R. Bradley, K. Baumert, & J. Pershing (Eds.), *Growing in the greenhouse: Protecting the climate by putting development first* (pp. 15-23). Washington, DC: World Resource Institute.

Bodansky, D. (2007). *International sectoral agreements in a post-2012 climate framework*. Pew Center. Retrieved May 9, 2009, from http://www.pewclimate.com/docUploads/International%20Sectoral%20Aggreements%20in%20a%20Post-2012%20Climate%20Framework.pdf

Bosi, M., & Jane, E. (2005). *Exploring options for "sectoral crediting mechanisms"*. Paris: Organization for Economic Co-operation and Develop-ment (OECD)/International Energy Agency (IEA), COM/ENV/EPOC/IEA/SLT (2005) 1.

Clémençon, R. (2008). Bali road map. A first step on the difficult journey to a Post-Kyoto protocol agreement. *Journal of Environment and Development, 17*(1), 70-94.

Cosbey, A., Parry, J. E., Browne, J., Babu, Y. D., Bhandari, P., Drexhage, J., et al. (2005). *Realizing the development dividend: Making the CDM work for developing countries*. Winnipeg, Manitoba, Canada: International Institute for Sustainable Development.

Egenhofer, C., & Fujiwara, N. (2008). *Global sectoral industry approaches to climate change. The way forward*. , Brussels, Belgium: Center for European Policy Studies.

Figueres, C. (2007a, May) From tons to trends. In L. Swart & E. Perry (Eds.), *Global environmental governance, perspectives on the current debate* (pp.). New York: Center for UN Reform Education.

Figueres, C. (2007b) *The Bali Batik: Design options for the post 2012 Climate Regime.* Sustainable Development and Human Settlements Division of ECLAC, Santiago de Chile.

Figueres, C., Haites, E., & Hoyt, E. (2005). Programmatic CDM Project Activities: Eligibility, Methodological Requirements and Implementation. Study for the Carbon Finance Business Unit of the World Bank.

Figueres & Newcombe. (2007). *Evolution of the CDM, 2012 and beyond*. United Nations Foundation.

Gregg, J. S., Andres, R. J., & Marland, G. (2008). China: Emissions pattern of the world leader in CO2 in Co2 emissions from fossil fuel consumption and cement production. *Geophysical Research Letters*, 35, L08806, doi: 10.1029/2007GL032887.

Holm Olsen, K. (2007). The clean development's contribution to sustainable development: A review of the literature. *Climatic Change, 84*, 59-73.

Holm Olsen, K., & Fenhann, J. (2008). Sustainable development benefits of clean development mechanism projects. A new methodology for sustainability assessment based on text analysis of the project design documents submitted for validation. *Energy Policy, 36*, 2819-2830.

Höhne, N. & Ellermann, C. (2008, August 20). *A sectoral approach and technology transfer for the cement sector*. Retrieved November 10, 2008, http://www.bafu.admin.ch/klima/index.html?lang=en&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1ad1IZn4Z2qZpnO2Yuq2Z6gpJCFeYR6fGym162epYbg2c_JjKbNoKSn6A--.pdf

Hoogzaad, J., Korthuis, A., & Streck, C. (2008, October). A call to reform. *Carbon Finance*.

International Energy Agency. (2008). *International energy agency, issues behind competitiveness and carbon leakage*.

International Emissions Trading Association (2008). *State of the CDM 2008*. Geneva, Switzerland: Author. Retrieved May 9, 2009, from http://www.ieta.org/ieta/www/pages/getfile.php?docID=3111

Meijer, E. (2007). The international institutions of the clean development mechanism brought before national courts: Limiting jurisdictional immunity to achieve access to justice. *NYU Journal of International Law and Politics, 39*, 877.

Meinshausen, M., Hare, B., Wigley, T. M. L., van Vuuren, D., den Elzen, M. G. J., & Swart, R. (2006, March). Multi-gas emissions pathways to meet climate targets. *Climate Change, 75*, 151-194.

Michaelowa, A., & Purohit, P. (2007). *Additionality determination of Indian projects: Can Indian CDM project developers outwit the CDM executive board?* Available from http://medias.lemonde.fr/mmpub/edt/doc/20070608/920594_additionality_determination_of_indian_cdm_projects.pdf

Nussbaumer, P. (2009). On the contribution of labelled certified emission reductions to sustainable development: A multicriteria evaluation of CDM projects. *Energy Policy, 37*, 91-101.

Røine, K., Tvinnereim, E., & Hasselknippe, H. (Eds.). (2008, March 11). *Carbon 2008. Post-2012 is now*. Retrieved May 9, 2009, from www.cabi.org/environmentalimpact/?site=138&page=165

Samaniego, J., & Figueres, C. (2002). Evolving to a Sector-Based Clean Development Mechanism. In K. Baumert, O. Blanchard, S. Llosa & J. F. Perkaus (Eds.), *Building on the Kyoto protocol: Options for protecting the climate* (pp. 89-108). Washington, DC: World Resources Institute.

Schneider, L. (2007). *Is the CDM fulfilling its environmental and sustainable development objective? An evaluation of the CDM and options for improvement*. Berlin, Germany: Oko Institut.

Stehr, H. J. (2008). *Does the CDM need an institutional reform*. Perspectives. Available from www.eci.ox.ac.uk/~dliverma/CV/UNEP%20RISOE%20CDM%20Liverman%20and%20Boyd.pdf

Sterk, W., & Wittneben, B. (2006, September). Enhancing the clean development mechanism through sectoral approaches: definitions, applications and ways forward. *International environmental agreements: Politics, law and economics,* 6, 271-287.

Streck, C. (2007). The governance of the Clean Development Mechanism—The case for strength and stability [Special Issue]. *Environmental Liability Journal, 15*(2), 91.

Streck, C., & Chagas, T. (2007). The future of the CDM in a post-Kyoto world. *Carbon & Climate Law Review, 1*, 53.

Streck, C., & Lin, J. (2008). Making markets work: A review of CDM performance and the need for reform. *European Journal of International Law, 19*, 409-442.

Sutter, C., & Parreño, J. C. (2007). Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects. *Climate Change, 84*, 75.

UN Framework Convention on Climate Change. (2007). *Investment and financial flows relevant to the development of an effective and appropriate international response to climate change*. Retrieved May 9, 2009, from http://unfccc.int/cooperation_and_support/financial_mechanism/items/4053.php

UN Framework Convention on Climate Change. (2007a). *Call for input on non-binding best-practice examples on the demonstration of additionality to assist the development of pdds, particularly for SSC project activities*. Retrieved May 9, 2009, from cdm.unfccc.int/public_inputs/dev_PDDs/cfi/R5142ZGKFD6FF6IW5MZEID3DJJKYH6

UN Framework Convention on Climate Change. (2008, November). *Update on Investment and Financial Flows*.Retrieved May 9, 2009, from http://unfccc.int/resource/docs/2008/tp/07.pdf

von Unger, M., & Charlotte S.(2009) An appellate body for the Clean Development Mechanism: A due process requirement. *Carbon and Climate Law Review*, 31.

Wara, M. (2006). *Measuring the clean development mechanism's performance and potential*. Working paper.

Wara, M. (2007). Is the global carbon market working? *Nature, 445*, 595.

Wara, M., & Victor, D. (2008, April). *A realistic policy on international carbon offsets* (PESD Working Paper No. 74).Stanford, CA: Stanford University.

Ward, M., Streck, C., Winkler, H., Jung, M., Hagemann, M., Höhne, N., et al. (2008). The *role of sector no-lose targets in scaling up finance for climate change mitigation activities in developing countries*. London: DEFRA.

Watanabe, R. et al. (2008). *The Bali roadmap for global climate policy: New horizons and old pitfalls.* Wuppertal Institute for Climate, Environment and Energy.

World Bank. (2006, November). *UKRAINE: Options for Designing a Green Investment Scheme under the Kyoto Protocol*. World Bank Report 37949, pp. 11-16. Retrieved February 20, 2009, from http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/UKRAINEINUKRAINIANEXTN/0,,contentMDK:21287333~pagePK:141137~piPK:141127~theSitePK:455681,00.html

World Bank. (2008). *State and trends of the carbon market 2008*. Retrieved November 10, 2008, from http://carbonfinance.org/docs/State___Trends--formatted_06_May_10pm.pdf

Christiana Figueres is a native of Costa Rica and has negotiated the Climate Convention and the Kyoto Protocol since 1995. She spearheaded the creation and development of the innovative programmatic CDM and is now Senior Climate Change Advisor to Endesa Latinoamerica and Vice President of the Bureau of the UNFCCC.

Charlotte Streck, PhD, is Director of Climate Focus and former World Bank Senior Counsel. Charlotte advises governments, private companies, foundations, and NGOs on climate policy and carbon finance. She has published extensively and serves as lead counsel with the CISDL at McGill University.