UNEP RISØ CENTRE
CD4CDM

A Reformed CDM

– including new Mechanisms for Sustainable Development

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UNEP Risø Centre

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EDITORIAL

Two things can be said about the CDM: it has been successful in creating a dynamic carbon market, and it can certainly be improved. Since the Kyoto Protocol entered into force in 2005, the CDM has developed very rapidly, with more than 4000 projects in the pipeline and a further 120 new projects entering the pipeline every month. Together, these projects represent a cumulative expected total of 2.8 billion tonnes of reductions by 2012. In a very short time, the CDM has mobilised billions of dollars in public and private investment to reduce emissions in developing countries.

At the same time, the CDM has encountered a number of challenges and weaknesses, including unequal regional distribution of projects, concerns about environmental integrity and technology transfer, complex governance procedures, and questions about the CDM's contribution to sustainable development.

This edition of *Perspectives* tries to answer the question, "Where to from here?" In other words: "How to reform the CDM in a post-2012 climate regime?"

In the decade since the Kyoto Protocol was established and the CDM conceptualized, it has become clear that the world has become a very different place. From the warm and tranquil beaches of Bali for COP 13 to the COP 14 in a much cooler Poland, global awareness of climate change has accelerated, along with serious concerns about the global economy. It is no small irony that a looming global economic slowdown could achieve the equivalent of all current CDM's reductions in a fraction of the time, but this is evidently not an attractive way to reduce emissions.

Irony aside, the global economic crisis also presents an enormous opportunity to 'lock in' emission reductions when the global economy eventually rebounds. This can only happen, however, if global businesses and governments pursue very much a "business unusual" approach. UNEP's Executive Director, Achim Steiner, has called for a "New Green Deal", citing "the flip side" of the current crisis as the enormous economic, social and environmental benefits that are likely to arise from combating climate change and re-investing in natural infrastructure, with "benefits

ranging from new green jobs in clean tech and clean energy businesses up to ones in sustainable agriculture and conservation-based enterprises".

For the CDM, these forces will shape the continuing negotiations for a post-2012 climate change agreement. Increasingly these negotiations are focused on three issues:

- Deeper emission cuts by all developed countries;
- Adaptation support in least-developed countries and small island countries that are most vulnerable to climate change; and
- Attracting and enabling greater participation by developing countries to reduce emissions.

Following the Bali Action Plan, the CDM and adaptation are two major ways to attract the participation of developing countries, which have agreed to undertake quantifiable emission reductions. To achieve this, developed countries have agreed to provide the measurable, reportable and verifiable technical and financial means required.

The challenge being most discussed now is how to build on the existing CDM to create much greater participation from developing countries post-2012 that can help them transit substantially to a development path free from damaging carbon emissions. Perhaps the CDM needs to move from a project-based level to a sector or programme-based level, as suggested by India's ambassador and former climate negotiator, Chandrashekar Dasgupta.

Henry Ford was fond of reminding his staff that "everything can be done better than it is". In this spirit, *Perspectives* explores how the CDM can be improved as negotiators prepare for a post-2012 climate agreement. In these pages, you will find diverse insights on reforming and reinforcing the CDM in a post-2012 climate regime from seventeen leading actors in the rapidly developing carbon market. The goal of compiling these views is to better inform the decisions of professionals and policy-makers in the lead-up to COP 15 in Copenhagen and beyond.

The thirteen papers in this *Perspectives* raises four key issues:

Sustainable development and equity

Working for the International Institute for Sustainable Development (IISD) in Canada, Murphy et al. examine the implications for the Development Dividend of four different climate-regime options in a post-2012 regime. Positioned in the DNA of Brazil, Americano asks to what extent the CDM has contributed towards transformational change for sustainable development in some sectors. Lesolle's perspective from Botswana explores CDM reforms to achieve a more equitable geographical distribution of CDM projects with benefits for African countries. The fourth paper by Liverman and Boyd presents ethical and development issues in the CDM from an academic perspective in Britain.

Institutional reform

Maosheng takes stock of the CDM's performance to date and offers a Chinese perspective on expectations for the future, including how the CDM can be scaled up to promote its current objectives further. Based on personal experience as the Chairman of the CDM Executive Board for two terms, Stehr analyses and discusses the need for an institutional reform of the CDM. Lequet and Elabed from France ask how procedural changes to the existing institutional framework may increase the supply of emission reductions. Lütken, a

Dane working for a Dutch company in China, proposes ways of dealing with the challenges of the prevailing unilateral, developing country financing of CDM projects, and the lack of technology transfer.

Expansion of project categories

Sanchez, from the US-based Clean Air Institute, focuses on the transport sector and asks how the CDM may be improved for this sector, while Niederberger, a senior expert on end-use energy efficiency from Switzerland, presents a vision for a CDM contributing to a global scaling up of energy efficiency.

Scaling up mitigation

Sector-no-lose-targets (SNLTs), a possible new carbon-market mechanism for scaling up investment in low-carbon technology in developing countries, is presented by Ward, a former negotiator from New Zealand. Rocha, a forestry expert in Brazil, asks if there is a role to play for land use, land use change and forestry (LULUCF) under CDM in a post-2012 regime, including options to finance reduced emissions from deforestation and forest degradation (REDD). Avendaño from Peru looks at Programmatic CDM and asks how replicable business models from other commodity markets can help mature the carbon market through management entities developing a secondary supply of carbon credits.

The success of the CDM has demonstrated the value of carbon markets as one tool to achieve internationally agreed political targets, but there are still concerns to be addressed and new mechanisms for sustainable development to be considered.

Given the increased complexity of a new climate agreement, it is likely that a reformed CDM will stick to what is desired by almost all Parties increased environmental integrity, simplified governance, achievement of sustainable development benefits, and flexibility towards programmes and policies. A transition towards a graduation process, with some of the large emitting developing countries moving from being eligible for CDM project-hosting to some other form of technical and financial support, is being discussed in the negotiations. It will probably not happen in Copenhagen, but this or other new approaches could be built into a review process, leaving some of the tough negotiations and needed analytical understanding to be worked out over time.

We hope this issue of *Perspectives* contributes to this goal.

The UNEP Risø Centre Energy and Carbon Finance Group

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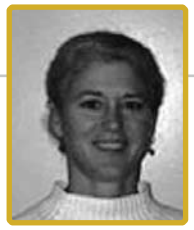

MARKET MECHANISMS FOR SUSTAINABLE DEVELOPMENT IN A POST-2012 CLIMATE REGIME:

Implications for the Development Dividend

Abstract
There is broad consensus in the international talks on a post-2012 climate change regime on the need for some perpetuation of the CDM—a market mechanism for sustainable development (MMSD). Regime options under discussion will impact on the "development dividend" of a post-2012 MMSD, affecting quality (sustainable development), quantity (volume of CERs) and regional distribution. This paper examines four regime options—increasing the scope of the CDM to include additional sectors, differentiation of developing country eligibility, expanding the CDM, and a fund-based mechanism—and their potential impacts on the three elements of the development dividend.

The nature and scope of the Clean Development Mechanism (CDM) is an important consideration in the international discussions on a post-2012 climate change regime. The negotiations have taken on increased intensity as negotiators seek to finalize a post-2012 regime by COP 15 in December 2009. The Bali Action Plan, adopted in December 2007, set out broad parameters to guide the two-year negotiating process, focusing on mitigation, adaptation, technology development and transfer, and financing and investment. The Plan also emphasized the importance of "Various approaches, including opportunities for using markets, in order to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries" (United Nations Framework Convention on Climate Change [UNFCCC], 2007a: 2). The current regime employs the CDM and Joint Implementation (JI) as market mechanisms, but one can imagine a number of different market mechanisms for

sustainable development (MMSD) that could play similar roles.[1]

Discussions at the UN meetings indicate that the current CDM could be subject to major changes in any post-2012 climate agreement. The Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) is deliberating possible improvements to the project-based mechanisms. Key elements being explored include broadening the scope of the CDM to include other activities (land use, land-use change and forestry (LULUCF), carbon capture and storage (CCS) and nuclear); and expanding the CDM to include sectoral CDM, sectoral crediting of emission reductions below a previously established no-lose target, and/or crediting on the basis of nationally appropriate mitigation actions (NAMA). Also under discussion are proposals to improve the functioning of the CDM, including standardized baselines and positive or negative lists of project activity types to improve environmental integrity and the assessment of additionality; differentiation of eligibility of partners; improved access to the CDM for least developed countries (LDCs) and small island developing states (SIDS); co-benefits as a criteria for registration; and multiplication factors to increase or decrease Certified Emissions Reductions (CERs) issued for specific project types.

Evident from these discussions is that most, if not all, UNFCCC Parties envision an important role for a CDM-like mechanism in the post-2012 regime. Yet there are different views of what constitutes an effective and appropriate mechanism. Many developed countries are interested in an MMSD that provides access to low cost credits to meet compliance targets under the Kyoto Protocol. But there are growing concerns about international offsets, with some viewing them as a wealth transfer, arguing that the current CDM market does not reflect actual reductions in emissions (Victor and Wara, 2008). Political sentiment in developed countries requires robust additionality processes to ensure the environmental integrity of credits under an MMSD. Developed countries are also interested in an MMSD as a means to engage developing countries in efforts to reduce emissions and to encourage large emitting countries to go beyond the CDM in the post-2012 regime.

Developing countries see the mechanism as an important means for supporting sustainable development, and are careful to safeguard their sovereign right to define what constitutes sustainable development in the national context. For most, it includes at least increases in the flow of investments, technology transfer and access to leading-edge clean technologies. Equity of access and the regional distribution of projects under the mechanism is particularly a concern for LDCs. Developing countries also want an MMSD that keeps demand robust. While this is dependent on governments reaching agreement on further greenhouse gas (GHG) emission reduction targets, the structure of the mechanism will have a bearing on supply and demand post-2012. As well, they are conscious of the fact that the integrity of the mechanism will also have an impact on demand from Annex I Parties, CERs being only one of several options for Annex I compliance via trading.[2]

1 In this paper, MMSD describes a market mechanism that can be used to achieve the goals of the current CDM as stated in Article 12 of the Kyoto Protocol, "to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments."

2 Currently, two other market-based mechanisms offer compliance units for Annex I Parties: Assigned Amount Units (AAUs) under International Emissions Trading (IET) and Emissions Reduction Units (ERUs) under JI.

An effective MMSD in a post-2012 regime will need to balance the demands and expectations of developed and developing countries, including addressing the issues of quality, quantity and regional distribution of projects—characteristics of the "Development Dividend" (Cosbey *et al.*, 2005). From a development dividend perspective, this means understanding how the future regimes could assist in improving:

- Quality – encouraging stronger sustainable development in developing countries;
- Quantity – ensuring access to cost-effective CERs that are commensurate with market demand, and encouraging large-scale investments in transforma-tive sectors such as energy and transpor-tation;
- Regional distribution – increasing investment in LDCs and other poor developing nations.[3]

The paper examines possible post-2012 regime structures, the potential role of the CDM or other MMSD within the structures, and the implications for the development dividend within each regime. To guide the analysis, the paper examines four possible regime options that are being discussed in the international negotiations:

- Targets with flexibility mechanisms:
- Differentiation of developing country eligibility;
- Expanded CDM; and
- Fund-based Mechanism.[4]

In Sections 2 to 5, each of the four options is examined, looking at regime characteristics and implications for the development dividend. The discussion on *quality* asks what the various regime options would mean for an MMSD's potential to contribute to sustainable development. The *quantity* discussion explores the implications of the regime options for the volume of CERs in the market. The discussion on regional distribution assesses the potential impacts of the regime options on the share of MMSD investment destined for least developed and poorer countries. Section 6 provides an overview of the four regime options and concluding comments.

Cosbey and Drexhage (2007) argue that there will be pressure for major developing countries to take actions commensurate with their capacity, which could include an expansion of Kyoto's simple two-tiered system.

Targets with Flexibility Mechanisms

A number of proposed post-2012 regimes being discussed in the international negotiations accommodate the CDM in more or less its current form. While many proposals suggest elements of improvement and streamlining, the CDM remains a project-based mechanism, albeit with programmes of activities. It operates within a regime that includes emission reduction targets, and differentiation between those with targets and those without. This is fairly straightforward, and currently includes Annex I and non-Annex

3 IISD's on-going Development Dividend Project explores what can be done to improve the quality, quantity and regional distribution of CDM projects. Project information and reports can be found at: http://www.iisd.org/climate/global/dividend.asp.

4 This discussion builds on an earlier IISD paper (Cosbey, Murphy and Drexhage, 2007) that surveyed 43 proposed post-2012 regime approaches to see what they implied for MMSDs. The 2007 survey also looked at technology approaches and concluded that such approaches, in and of themselves, do not include a role for an MMSD. Some technology actions could incorporate "market-plus" elements, such as carbon offsets; but these are not discussed in this current paper as there is little experience with technology credits (aside from sectoral-based approaches, which are included under the expanded CDM category).

I countries, where the CDM acts as a bridge between these two types of groups.

The AWG-KP discussions include proposals that would maintain the basic project-based structure of the CDM, but expand the scope to include additional eligible project activities, including other LULUCF, CCS and nuclear activities (UNFCCC, 2008).

Development Dividend Implications

Quality - The extent to which the CDM has contributed to sustainable development has been a major point of contention for many stakeholders and some have asserted that the CDM has not lived up to expectations in this regard. All CDM host countries are required to assess projects to ensure that they are compatible with their sustainable development objectives. And there have been a range of different approaches adopted by countries in terms of how they screen projects for achievement of these objectives. HFC-23 destruction and N_2O projects are the most contentious in this regard. CCS and nuclear projects have the potential to generate similar criticisms about their inability to contribute to sustainable development, and their potential to divert investments from renewable and energy efficiency—project areas with greater sustainable development benefits.

There is no guarantee that negotiators will agree on including these project sectors in a post-2012 CDM, but a possible solution for the quality issue, while not necessarily ideal, could be the levying of a tax on such projects with revenues put into a national sustainable development fund. This would be similar to systems already taxing the proceeds from carbon credit sales such as in China, Egypt and Vietnam. Such a solution is unlikely to be part of an international agreement and action would need to take place unilaterally at the country level.

Also, under discussion is the possibility of including co-benefits as criteria for the registration of CDM project activities (UNFCCC, 2008), including specific sustainable development benefits. The prospects of reaching such an agreement are low, as developing countries most likely will hold fast to their right to define sustainable development.

Quantity – Modifying the scope of eligible project activities has the potential to unlock a huge potential supply of credits at low prices. A study from the Woods Hole Research Center concluded that 94 percent of Amazon deforestation could be avoided at a cost of less than US$5 per tonne, compared to the US$25-35 per tonne trading range of existing CERs (Nepstad, *et al.*, 2007). If CDM revenues were available to boost incentives in this area, a large amount of cheap credits could potentially become available on the market—creating concerns of over-supply. This, combined with a potential increase in credits from CCS and nuclear projects (as well as sectoral credits and crediting on the basis of nationally appropriate mitigation actions, discussed in Section 4), could completely swamp the market.

Of course, this depends on the broader international agreement. If there was agreement to limit global average temperature increase to 2˚C compared to pre-industrial levels, the supply of CDM credits may not be able to meet demand. And political sentiment in developed nations may result in less desire for meeting targets through international purchases—favoring domestic action or other compliance credits—dampening demand.

Regional distribution – A wider scope of LULUCF projects could encourage broader participation in the CDM. There is huge potential in non-Annex I countries for LULUCF projects in addition to afforestation and reforestation—such as improved agriculture, reducing the unsustainable use of biomass energy, revegetation, and reducing emissions from deforestation and degradation (REDD).[5] Indeed, Schlamadinger's (2007) research determined that a broader LULUCF scope could help ensure a more regional distribution of CDM projects, especially for Africa. It is the position of the African Group that REDD should be considered under the project-based mechanisms to help improve regional equity; and the LDC negotiating group has called for a broadening to LULUCF activities to allow greater access for LDCs to the CDM (Third World Network, 2008a: 3).

In regard to broadening the scope to include CCS and nuclear, there is some concern that such projects would continue to benefit the larger, more economically-advanced developing nations. The UNEP-Risoe Centre's (2008) CDM pipeline indicates that the top three host countries—China, India and Brazil—host over 70 percent of approved CDM projects and will generate three-quarters of all CERs by 2012.

Differentiation of Developing Country Eligibility

The international negotiations include a highly contentious discussion of possible graduation of some non-Annex I Parties to a state of target- or action-based commitments. Arguing for differentiation in the August 2008 Accra discussions, Australia noted that 45 developing countries have a GDP per capita higher than that of Ukraine which is an Annex I country—including South Korea, Qatar, Bahrain, Saudi Arabia, Singapore, Bahamas—suggesting that this be an indicator for differentiation (Third World Network, 2008b). Cosbey and Drexhage (2007) argue that there will be pressure for major developing countries to take actions commensurate with their capacity, which could include an expansion of Kyoto's simple two-tiered system. Most (but not all) developing nations, on the other hand, argue that the only differentiation under the Convention and the Bali Action Plan is the differentiated response between developed and developing countries under the principle of common but differentiated responsibilities, including the historical responsibilities of the developed countries for GHG emissions.

Approaches that favour graduation of some non-Annex I countries will have perhaps the most interesting impacts on the function of any MMSD. An option would be to involve the major developing country Parties with targets in IET and JI-like mechanisms, perhaps providing incentives for developing country participation by allowing these countries to receive large amounts of surplus allowances. There could be a separate scaled-down version of the current CDM for those countries without targets. There are disincentives (discussed below) for developing countries to pursue such a negotiated outcome, perhaps surmountable by the granting of large surplus allowances matched by tough Annex I targets.

Development Dividend Implications

Quality – With selective differentiation, the CDM would probably become more oriented to development than mitigation, serving the needs

5 Other approaches to REDD financing are also being discussed in the negotiations, including a market-linked system whereby a dedicated REDD trading mechanism is established and a non-market approach where a small proportion of international emission allowances would be sold to developed countries with the revenues going into a fund to support REDD efforts in developing countries.

of lesser developed countries and comprising a portfolio of projects that achieve high development dividends.

While the CDM is explicitly aimed at fostering sustainable development in the host countries, IET and JI have no such explicit aim. If the starting point is the need for an MMSD focused on both low-cost emissions *and* sustainable development, then one option would be to "green" AAUs in a development-friendly manner, or to amend the JI to include sustainable development requirements (i.e., the requirement for host country approval on sustainable development grounds). This could be made effective exclusively for developing country hosts, or more broadly for all host countries.

On the other hand, it can be argued that JI *implicitly* includes an imperative to foster sustainable development, or at least to serve national interests according to some definition. If a JI project offered no development dividend, there would be no reason for a host country to allow it, given that any ERUs it produced would result in increases to the host's emission reduction commitment. In fact, since some percentage of JI projects will inevitably be non-additional, the ancillary benefits of the project roster as a whole will have to be seen by the host to be sufficient to *more* than balance out the resulting effective increases in its assigned amount.

One implication of a JI as a replacement for the CDM is that such a regime would shift the burden for determining additionality away from the international level and toward the national (to the extent that the new mechanism functioned like Track 1 JI). That is, at the global level the JI mechanism does not allow for a net reduction in emission reduction commitments, so only the host state needs to be concerned about additionality. This would greatly simplify the international administrative machinery as compared to the CDM, but it might also result in inefficient duplication of similar efforts at each national level.

Any regime that incorporated such a mechanism, of course, would have to account for the fundamental differences between this and the existing narrow CDM. From a developing country perspective, the existing CDM is a more or less unblemished good, bringing as it does a measure of development dividend without any attendant obligations. A JI-type mechanism that covered developing countries would still bring those sorts of benefits to host countries, but would take place in the context of host country obligations to reduce emissions, and would see all credits accruing to the investor's home country, counting toward its reduction commitment. In effect, this requires the host country to give up low hanging fruit for the emissions reduction benefit of others. As such, developing countries would presumably need to be compensated in the design of the regime for losing the CDM.

Quantity – A regime with selective differentiation means that the market will not experience the large volumes of credits as seen from the major CDM players. The major developing countries are by and far the main suppliers of CERs up to 2012. If, for example, we removed China from the market, the number of projects in the current CDM pipeline would be reduced by 36 percent and the number of CERs by 2012 would drop fully by 54 percent (UNEP-Risoe Centre, 2008). This shortfall might be made up to some extent by broadening the scope of the CDM, and some developed countries may turn to ERUs or AAUs to meet compliance targets.

Regional distribution - Differentiation could impact on the regional and equitable distribution of projects. As countries graduate from the CDM, a greater share of the market will be open to LDCs. At present, regional distribution is very unequal with Latin America & the Caribbean and Asia & Pacific together accounting for over 95 percent of CDM projects and just under 95 percent of CERs. LDCs account for 28 projects in the CDM pipeline—less than 1 percent of the projects and 1 percent of the CERs (UNEP-Risoe Centre, 2008). Of course there is no guarantee that the funds that formerly flowed to large targets of CDM finance would actually be redirected to CDM in smaller countries. Investment tends to flow to the best available opportunities, and if the barriers to CDM investment in those countries are high enough, the market might simply shrink, rather than redistribute. In fact such an effect is practically guaranteed—the question is simply how significant it would be.

Expanded CDM

An expanded CDM or a broader MMSD, which seeks to overcome perceived constraints of the current project-based approach by resort to policy or sectoral approaches, is also a topic in the post-2012 negotiations. The international discussions have narrowed the focus to include sectoral CDM for emission reductions below a baseline defined at a sectoral level; sectoral crediting of emissions reductions below a previously established no-lose target; and crediting on the basis of NAMA. While the existing architecture of the CDM would need to be modified to accommodate these proposals—technical issues such as baselines, monitoring and verification, and institutional issues such as working through the Executive Board could build on the current CDM framework.

There is considerable interest in sectoral crediting mechanisms, but the various formulations, to greater or lesser degrees, are subject to serious limitations. A primary difficulty is that there are not many sectors that would be amenable to sectoral crediting; it demands a small number of coordinated large emitters. For both sectoral and NAMA crediting mechanisms, baseline determination is plagued with fundamental difficulties, there is no easy way to determine additionality, and it is difficult to get around the problem of punishing first movers by crediting only those that moved after the implementation of a sectoral crediting or crediting on the basis of NAMA. Baron and Ellis (2006) argue that the difficulties of coordinating sectoral crediting mechanisms across a number of linked domestic and regional trading systems would probably prove insurmountable; and the same could hold true for credits based on NAMA.

The major developing countries are by and far the main suppliers of CERs up to 2012. If, for example, we removed China from the market, the number of projects in the current CDM pipeline would be reduced by 36 percent and the number of CERs by 2012 would drop fully by 54 percent (UNEP-Risoe Centre, 2008).

Development Dividend Implications

Quality - The potential for an expanded CDM to contribute to sustainable development is obvious. Sectoral CDM could be employed to exploit the win-win opportunities in sectors such as deforestation, energy and transportation, all

of which have enormous development linkages. Crediting on the basis of NAMA offers countries a more strategic and integrated mechanism, encouraging linkages with national development policies and encouraging project activity in such sectors as energy efficiency, renewable energy and transportation—sectors that tend to generate higher development dividends.

Quantity - Sectoral CDM holds potential for an enormous amount of GHG mitigation, on a scale that far outpaces the current project-by-project formulation of the CDM (Bosi and Ellis, 2005). Thus, an expanded CDM may give rise to the concerns discussed above in Section 2 about flooding the market for compliance units. One of the key benefits that many see in the prospect of an expanded CDM is its ability to deliver large quantities of GHG reductions as compared to the current bottom-up approach. But the question is whether the resulting flow of CERs would in fact find buyers, or to what extent the price of CERs would reach disastrous lows. Baumert and Winkler (2005) have argued that the expanded version of the CDM would vastly increase the potential for generating credits, perhaps well beyond what the market would bear in terms of demand. The analysis above cited projections of demand for all Kyoto compliance mechanisms—not just CERs—of between 1.6 and 2.5 GT by 2012. On the supply side, very conservative estimates indicated potential for policy CDM to yield at least 3.6 GT of annual CO_2e reductions by 2030 (Cosbey, Murphy and Drexhage, 2007: 14).

An expanded CDM has clear potential to reduce GHG emissions at a higher order of magnitude than the narrow version. This may be good news for buyers, but only up to a point. If the market becomes swamped it will crash, with values for CERs coming in at well below what proponents projected, potentially leading to widespread abandonment of project-based initiatives. One clear implication for a regime that includes an expanded CDM is the need for ambitious reduction targets that will fuel demand for the additional CERs that may be brought on line, though the expanding voluntary market may pick up some of any excess supply.

Regional distribution – Sectoral CDM would be likely to start in the more advanced developing nations, because they are more likely to have a large industrial base, and have worked with existing sectoral initiatives such as the Cement Sustainability Initiative. Crediting on the basis of NAMA would also likely favour the more advanced developing nations, continuing the pattern of uneven regional distribution of projects. There are proposals that recognize this imbalance, with South Korea suggesting that a share of proceeds from the revenue of NAMA credits be allocated to support LDCs and Small Island Developing States (Republic of Korea, 2008).

Fund-based Mechanism

Financing is an explicit part of the Bali Action Plan and the negotiations include discussion of the types of institutional innovation that might support the necessary financial transfers from developed to developing countries. . There could be potential for linking some of the transfers to specific sustainable development attributes by associating the support with a fund-based mechanism.

The original proposal from Brazil that led to the creation of the CDM was for a clean development *fund*, endowed by Annex I countries, which would support sustainable development in developing countries in ways that also achieved mitigation. As well, Mexico (2008) recently proposed a

Green Fund that would support such activities, though the resulting emissions reductions would not be used to offset emissions in developed countries. A fund-based mechanism based on these conceptions is discussed here because it is unique among the options described; it can operate within and outside a regime of internationally agreed targets.

A fund-based mechanism could have a scope similar to the CDM, and would consist of mandatory contributions from UNFCCC Parties, the nature and extent of the contributions being a matter of international negotiations. In the end there are a number of ways that contributions could be assessed. The Mexican proposal calls for basing contributions on an index composed of GHG emissions (present and historic, absolute and per-capita), GDP and population.

This fund would then be used to purchase emission reduction credits from GHG-reducing projects, policies or programs in developing countries. If the Fund operated under a regime with targets, the credits involved could be used to retire obligations of the funders, assigned in proportion to contributions. If it operated under a regime without targets, it would be considered a straight funding mechanism, similar to the Mexican proposal, able to fulfill developed countries' Article 4.3 UNFCCC obligations to cover the incremental costs of addressing climate change in developing countries.[6] In contrast to the "with targets" Fund, such a scheme would result in *net* global mitigation of GHG emissions.

There are a number of ways in which the Fund could disperse its resources, but primary among the design considerations would be a desire to harness the ingenuity and energy of the private sector, as does the existing CDM. One possibility would be a reverse auction arrangement, whereby project proponents would commit to delivering credits for agreed prices, and would bid against each other in competition for contracts. Under this scenario, contracts would be awarded to the lowest bidder that satisfied the methodological requirements (such as additionality), and the bidding would stop when the budget tranche for a particular time period had been exhausted.[7] Inevitably there would be projects for which the terms of the contract were unfulfilled, for example because the project failed to receive project funding. The unused funds from such projects could simply be rolled back into the next tranche of funding.

Development Dividend Implications

Quality – A fund-based mechanism could be structured to explicitly direct financial transfers to sustainable development priorities. There may need to be a specific definition for sustainable development under the fund, i.e., the project meets an agreed list of minimal sustainable development benefits or is ranked on a point system. A funding mechanism could also be combined with a more traditional type of MMSD, in a pairing that had the fund focusing more explicitly on sustainable development and the more traditional mechanism focusing on sheer volume.

6 If the Fund operated in this mode, there is no reason why it could not welcome non-governmental "voluntary market" investors as well, in a scheme that could simultaneously give that market the credibility it needed, and provide important extra funding for mitigation and sustainable development in developing countries.

7 One advantage to such a process is that it would eliminate some of the huge producer surplus generated by the current system. In a reverse auction it is highly unlikely, for example, that HFC projects with costs as low as US$1/tonne would fetch the kinds of prices they are currently fetching in the carbon market.

Quantity – Could a fund supported entirely by governments foster the same volume of GHG reduction units as could a market mechanism, such as the current CDM, that relies extensively on private investment? While no hard data exists for the magnitude of CDM investment, UNFCCC (2007b) estimates that there was US$7 billion invested as a result of the CDM projects that were registered in 2006—a figure that is probably well below the capacity of a reformed CDM to deliver in the post-2012 context. To give an indication of the magnitude of that flow relative to the kind of flows made available by governments for the same sorts of purposes, note that the total funding for the most recent four-year replenishment for the Global Environment Facility averaged out to about US$0.8 billion per year. Of this, it disburses about US$250 million per year on mitigation-related activities. Another standard for comparison is provided by the recently established and highly publicized World Bank Climate Investment Funds (part of which will be devoted to adaptation funding), which combined are targeted to reach US$5 billion over 3 years, or US$1.7 billion per annum.

In light of these standards, there might be cause for concern in relying only on a government-supported fund to support mitigation efforts. It would certainly be a challenge to raise the kind of money needed to even replace the private sector investment that currently goes into the CDM, much less the potential investment under a reformed and broadened CDM. The recent economic downturn suggests that it may be a difficult time to generate significant new funds in many developed countries, particularly if these funds are perceived to support investment in major developing countries, such as China, with its rising economic power.

Regional distribution – A fund-based mechanism may be the most suited to equitable regional distribution, whereby a portion of the funding can be allocated to LDCs. The percentage of funding allocated to poorer countries would need to be carefully considered. While it may be true that the major developing countries account for the majority of CDM investment, it is also true that they also account for the majority of population, GDP and energy use among developing countries. A weighted distribution of funding using, for example, an average of population-deflated and GDP-deflated figures, could help to determine an equitable distribution of funds.[8] Of course, capacity building to set up an enabling environment for climate mitigation investment will be needed in many LDCs.

Conclusion

There is uncertainty about the long-term nature of the carbon market, but there is broad consensus in the international talks on a post-2012 climate change regime on the need for some perpetuation of the CDM—a market mechanism for sustainable development. Emissions trading will likely form an important cornerstone of future action on climate change, and the CDM or other MMSD with a strong focus on cost efficiency and flexibility is important to businesses seeking credits for compliance. And such a mechanism can help developing countries encourage sustainable development and contribute to the objective of the UNFCCC to reduce GHG emissions, consistent with the goal of Article 12 of the Kyoto Protocol.

The structure of the post-2012 regime will have a strong influence on the development dividend.

8 See Cosbey (2006: 26-29) for a discussion of weighted regional distribution of CDM projects.

If developed country concerns of access to reasonably priced quality credits are met and there is meaningful participation by developing countries, especially the large emitters of China, India and Brazil, there likely will be high demand for these credits.[9] If these concerns are not met and the sustainable development benefits of CDM projects are questionable, there could be strong political pressure in developed countries to undertake domestic emission reductions, weakening the market for credits under the CDM.

Four possible post-2012 regime options and the implications for the development dividend within each approach have been examined in this paper. As noted in Table 1, a fund-based mechanism is best able to address the issues of quality and regional distribution because it can be structured to explicitly direct financial transfers to sustainable development priorities and LDCs. But it will be challenging, and likely impossible, to get agreement on a level of funding similar to that expected to flow through an MMSD. A regime with graduation criteria could create a greater market share for LDCs, but there is no guarantee that investment will flow to these countries. A wider scope for LULUCF projects also could benefit LDCs, but considerable capacity building would likely be needed to create conditions to attract investment. LULUCF projects also offer considerable promise for generating SD benefits; as does expanding the CDM to include crediting on the basis of NAMA and sectoral CDM.

In regard to quantity, if the more advanced developing nations take on targets, the CDM market will see massive reduction in volumes supplied since the majority of projects and CERs in the current pipeline are from such countries. There are, however, options to increase the supply of CERs, such as broadening the scope of and expanding the CDM. Under such regimes the main consideration would be the volume of credits potentially issued and the subsequent impacts on the carbon market. Absent ambitious Annex I targets, the high volumes generated might have the potential to increase the supply of CERs to the point where the market might be swamped. In such a case there may be potential for CERs to sell on the as-yet-nascent voluntary market. Without increases in demand, prices might hit destructively low levels under some of the broadened and expanded CDM scenarios.

Key elements being explored include broadening the scope of the CDM to include other activities (land use, land-use change and forestry (LULUCF), carbon capture and storage (CCS) and nuclear); and expanding the CDM to include sectoral CDM, sectoral crediting of emission reductions below a previously established no-lose target, and/or crediting on the basis of nationally appropriate mitigation actions (NAMA).

It is important to note that the more attractive an MMSD becomes in a post-2012 regime, other things being equal, the less incentive any developing country has to take on targets that entail lost access to the mechanism.[10] If the post-

9 Of course, as noted above, if "meaningful participation" takes the form of developing country targets, the CDM as it is currently configured will not operate.

10 The assumption of other things being equal is important. It is of course possible to imagine a regime such as those described in Section 3, involving targets for all, emissions trading, with tough enough developed

Table 1: Development dividend impacts of post-2012 approaches under discussion in the international negotiations

Approach	Regime Characteristics	Development Dividend Implications		
		Quality	Quantity	Regional Distribution
Targets with flexibility mechanisms – broadening the scope	Emission reduction targets Differentiation of those with targets and those without	LULUCF projects offer considerable SD benefits Projects with questionable SD benefits could be included (e.g., CCS, nuclear)	Broadening scope could unlock huge potential supply of credits, perhaps beyond what the market can bear in the absence of ambitious targets in developedcountries	Wider scope of LULUCF projects could encourage broader participation, including LDCs, CCS and nuclear projects likely to benefit more advanced develoing nations
Differentiation of developing country eligibility	Emission reduction targets Differentiation of those with targets and those without Graduation criteria for developing countries	IET and JI have no aim to foster SD; options are to green AAUs or amend JI to include SD requirements CDM could be more oriented to serving the SD needs of lesser developed countries	Market will not experience large volume of CERs (as the main suppliers of credits up to 2012—more advanced developing countries—will graduate	Greater share of market open to LDCs, but no guarantee that CDM funds will be redirected to these countries
Expanded CDM	Emission reduction targets Differentiation of those with targets and those without	Sectoral CDM could exploit development linkages in such sectors as deforestation, energy and transportation Crediting on the basis of NAMA offers linkages with national development priorities and activities in high SD areas.	Vastly increased potential for CERs, perhaps beyond what the market can bear in the absence of ambitious targets in developed countries	Sectoral CDM and crediting on the basis of NAMA would benefit the more advanced developing countries, continuing the pattern of uneven regional distribution
Fund-based mechanism	Could operate within and outside a regime of internationally agreed targets	Fund structure could explicitly direct financial transfers to SD priorities	Challenging for a government-supported fund to replace the level of private sector investment that goes into the CDM	Most suited to equitable regional distribution, whereby a portion of funding can be allocated to LDCs

2012 regime includes a radically expanded MMSD that covers sectoral and NAMA initiatives, it is offering governments the opportunity to fund a variety of policies and programmes that they might have as current priorities, but for which they lack the requisite resources. This clearly counts as a more attractive MMSD.

Given the broad desire for some sort of MMSD in the post-2012 regime, it is important to understand the significance of the various possible regimes on the shape of an MMSD. This paper takes a first step in this direction, providing policy makers with a deeper understanding of the development dividend implications (quality, quantity and regional distribution) of various MMSDs.

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country targets and generous enough allowances for developing countries to overcome the disadvantage of losing the CDM as a mechanism.

References

Baron, R. and J. Ellis, 2006. Sectoral Crediting Mechanisms for Greenhouse Gas Mitigation: Institutional and Operational Issues. OECD Environment Directorate and International Energy Agency. COM/ENV/EPOC/IEA/SLT(2006)4.
Baumert, K. A. and H. Winkler, 2005. "Sustainable Development Policies and Measures and International Climate Agreements." In Bradley, Rob, Kevin A. Baumert et al., Growing in the Greenhouse: Protecting the Climate by Putting Development First. Washington, D. C.: World Resources Institute. pp. 15-23.
Bosi, M. and J. Ellis, 2005. Exploring Options for "Sectoral Crediting Mechanisms." Paris: OECD Environment Directorate and International Energy Agency. COM/ENV/EPOC/IEA/SLT(2005)1.
Cosbey, A., 2006. "Defining and Measuring the Development Dividend." Making Development Work in the CDM: Phase II of the Development Dividend Project. pre-publication version. Winnipeg: IISD.
Cosbey, A. and J. Drexhage, 2007. Advancing Development Goals in a Sustainable Manner: Options and Implications for Post-2012 International Climate Change Efforts. A Way Forward Working Paper #1. Winnipeg: International Institute for Sustainable Development.
Cosbey, A., D. Murphy and J. Drexhage, 2007. Market Mechanisms for Sustainable Development: How do they fit in the various post-2012 climate efforts? Winnipeg: IISD.
Cosbey, A., J. Parry, J. Borwen, Y.D. Babu, P. Bhandari, J. Drexhage and D, Murphy, 2005. Realizing the Development Dividend: Making the CDM Work in Developing Countries. Winnipeg: IISD.
Mexico, 2008. Submission by Mexico. Submission to the third session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. <http://unfccc.int/files/kyoto_protocol/application/pdf/submission_mexico.pdf>.
Nepstad, D., B. Soares-Filho, F. Merry, P. Moutinho, M. Bowman, S. Schwartzman, O. Almeida and S. Rivero, 2007. The Costs and Benefits of Reducing Carbon Emissions from Deforestation and Forest Degradation in the Brazilian Amazon. Falmouth, MA: Woods Hole Research Center.
Republic of Korea, 2008. Market-based Post-2012 Climate Regime: Carbon Credit for NAMAs. Submission to the third session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. <http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/market_based_climate_regime-korea.pdf>.
Schlamadinger, B., 2007. "Post-2012 eligibility of land-use and bioenergy activities in the CDM." Presented at Annex I Expert Group Seminar with Developing Countries: *Working Together to Respond to Climate* Change, 19-20 March 2007, Paris.
Third World Network, 2008a. "Accept ambitious reduction targets, Annex I told at Kyoto group meeting." *TWN Accra News Update 2*. 22 August. Penang, Malaysia: Third World Network.
Third World Network, 2008b. "North floats idea of new climate regime, South warns this threatens Copenhagen outcome." *TWN Accra News Update 9*. Penang, Malaysia: Third World Network.
UNEP-Risoe Centre, 2008. *CDM Pipeline Overview*. September 1st, 2008 version. <http://www.uneprisoe.org/>.
UNFCCC, 2007a. *Bali Action Plan*. Decision adopted by COP 13 and CMP 3. December 2007. <http://unfccc.int/files/meetings/coop_13/application/pdf/cp_bali_action.pdf>.
UNFCCC, 2007b. *Investment and financial flows to address climate change*. Bonn: UNFCCC
UNFCCC, 2008. Emissions trading and the project-based mechanisms: Draft conclusions proposed by the Chair. Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. Sixth Session, Accra, 21-27 August 2008 and Poznan, 1-10 December 2008. FCCC/KP/AWG/2008/L.12, 27 August.
Wara, M. and D. Victor, 2008. A Realistic Policy on International Carbon Offsets. PESD Working Paper #74. Palo Alto, CA: Stanford University.

Branca Americano
Designated National Authority (DNA) Brazil

CDM IN BRAZIL:

Towards Structural Change for Sustainable Development in Some Sectors

Abstract
In this article, experience with CDM in Brazil is analysed in terms of its capacity to promote long-term benefits in the direction of a low-carbon economy. For this purpose, a set of 280 projects, including projects at the validation stage and approved projects, are categorized according to project type and analysed using two criteria: the number of projects in each category, and emission reductions. For each of the categories – landfill gas, N_2O from industry, hydro-power plants, biogas from pig farms and bagasse – the sector and/or technology is briefly described and how the CDM project activity has impacted and transformed the sector analysed.

As everyone knows CDM is a mechanism with very particular characteristics. It has an important economic basis, and the intention is to optimize resource allocation and minimize costs for emission reductions while contributing to the sustainable development of host countries. Nevertheless the mechanism as it is in real life is the result of hard negotiations and a possible consensus among 189 Parties. Its final design is not completely rational or optimized, and many people who did not follow the negotiations have difficulties in understanding some of its characteristics.

The two main concepts on which the mechanism is based are the concepts of additionality and its contribution to sustainable development. Both concepts are as complex as the mechanism itself. Sustainable development is up to each country to define and so is not objective or comparable as a concept. Additionality is also a difficult concept

because of the underlying notion of a baseline. It is difficult to establish without a doubt what is the baseline scenario and to what extent the CDM makes the difference when deciding to pursue a particular project activity. It is also difficult to determine to what extent the CDM, which most of the time makes only a marginal contribution, has a definitive role in pushing the balance in the direction of implementing the project activity. Nevertheless it is unquestionable that the CDM is a success and has introduced structural changes in some sectors in some countries.

In this article I will analyse the CDM in Brazil. First, I will discuss the concept of sustainable development in the Brazilian context. Then I will analyse the evolution of the CDM in the country since the beginning of 2004, including projects that are in the pipeline awaiting validation. Then I will analyse some of the main types of projects to assess how they have changed their own sectors and how they have contributed to sustainable development in some aspects. The analysis is based on my experience of working in the executive secretariat of the Brazilian DNA, as well as on interviews with project developers and sectoral stakeholders.

Sustainable Development in Brazil

The Brazilian DNA is the Interministerial Comission on Climate Change (CIMGC) consisting of 11 Ministries which meet once every second month to analyse projects and assess its contribution to sustainable development. Project proponents have to prepare a document, known as "Annex III", in which the contribution of the project activity under five different aspects or headings must be explained. These five headings are: 1) contribution to local environmental sustainability; 2) contribution to the improvement of labour conditions and net job creation; 3) contribution to the distribution of income; 4) contribution to training and technological development; and 5) contribution to regional integration and linkages with other sectors. There is no threshold for any of these five aspects or headings, nor any kind of indicator for any of them, nor any measure for all the aspects of sustainable development. The DNA takes into account the project itself based on the document, which explains the contribution to sustainable development (Annex III) and takes into consideration the whole picture. In many cases the CIMGC requests additional information and clarification about the contribution envisaged to some of the sustainable development aspects described by the project proponent. The purpose is to make clear in the document the aims of the project proponents, who must make Annex III available to local stakeholders during consultation in the validation period. The document also remains on the Brazilian CDM homepage after the project has been registered. Making Annex III public, with a clear statement of how the project activity contributes to sustainable development, to some extent constrains the project proponents to comply with its promises. As it is well known, the letter of approval (LoA) is requested only once, at the moment of registration of the project activity. At this time, the host country issues a LoA stating that the project contributes to the sustainable development, though most often based on projects that are not yet in place, so that many of the aspects cannot be checked before registration. They consist of promises such as job creation, benefits for local communities, etc. However, there is no monitoring of the contribution to sustainable development. The control that the DNA has after issuance of the LoA is very limited. If the project does not comply with the country legislation, it is very easy to stop the activity using domestic law. However, if other aspects, like the number of new jobs created, are

not in place as promised in Annex III, nothing can be done about it. In this regard, having Annex III publicly available and associated with the PDD in the Brazilian homepage is one way to ensure that promises are kept. It is important to mention that Parties can always request a review of projects at the moment of the registration and issuance of CERs if they wish. In addition, Brazil has the ability to cancel and/or revoke the LoA. This possibility is based on the fact that the LoA is an administrative act and hence can be cancelled or revoked. Article 2 of Resolution 4 states that if, after the issuance of the LoA, new information comes to light providing evidence of illegal acts or acts contrary to the public interest, the Commission may cancel or revoke the LoA, provided all procedures for the exercise of the right of defence are followed. This ultimate resource can be used in very special cases. The idea is not to use it as a common procedure, i.e. as an administrative procedure, but rather as a political one in extreme situations.

Besides these aspects of sustainable development adopted by the Brazilian DNA, this paper will consider another aspect, namely the capacity to promote long-term benefits in the direction of a low-carbon economy. The idea is to assess to what extent a type of project introduces long-term benefits to sustainable development beyond those of each individual project. In this paper I will elaborate on the ability of a type of CDM project to introduce structural changes, that is, to promote clean and renewable technologies which point clearly to decarbonization of the production and consumption patterns on a sustainable and long-term basis.

CDM projects in Brazil

Brazil was once a pioneer in the CDM. The country was the first to have its methodology approved and the second to register a project, and for some years it was leading all the indicators for CDM projects. It is evident that, due to Brazil having a very low carbon-intensive energy matrix, India and China immediately took the lead in the process. Nevertheless Brazil still has a high potential for CDM projects. The main comparative advantage is that we have an important institutional structure for the CDM already in place: project developers, financing institutions, DOEs and DNA with great experience. This is an important distinguishing feature compared to other countries because it allows stakeholders to identity CDM opportunities in the country. Currently many changes can be identified in the profile of CDM in Brazil. The main objective of this article is to identify what kinds of projects have contributed to structural changes in some sectors and how.

However, there is no monitoring of the contribution to sustainable development. The control that the DNA has after issuance of the LoA is very limited.

To assess evolution over time, projects are identified by the starting date of comments. This mode of reference was chosen because it allows a comparison of all projects in the pipeline, including those which are not yet registered. Projects which were rejected were excluded from the analysis. The database used comes from the

pipeline produced by Jørgen Fenhann, UNEP Risø Centre, version dated 11 June 2008. Thus the 2008 figures cover less than six months.

The assembly taken into account in this analysis considers 280 project activities with expected reductions of 176,987 ktCO2 until 2012. In terms of power, installed capacity is 5958 MW. Many different types of project have been implemented since 2004, but it is possible to identify types of project that predominate in terms of both quantity and emissions reductions. The following table brings together the main types of project that have been implemented in Brazil.

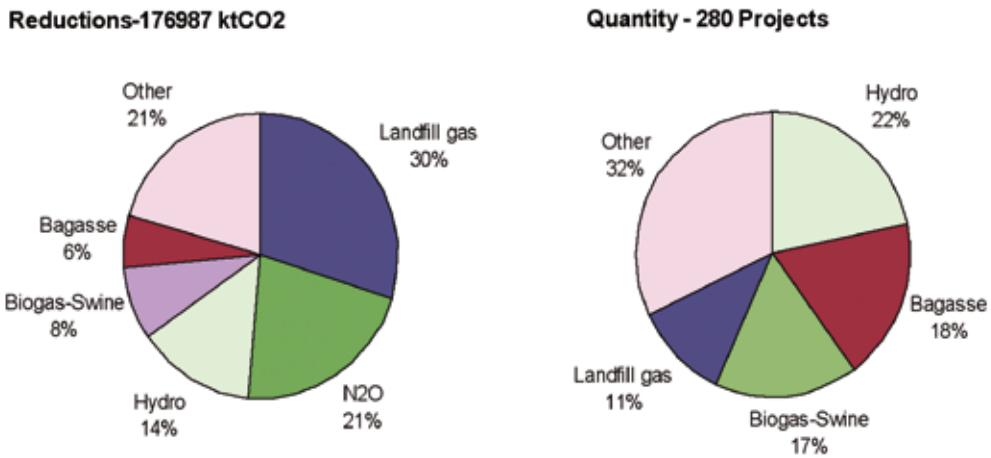
After identifying the cluster of projects that are significant in terms of number and emissions reductions, the project categories will be analysed and attempts made to identify their contribution to sustainable development. One particular concern is the contribution to changing the carbon intensity of a sector.

Landfill gas project activities

The situation in the country regarding the disposal of solid waste is very precarious. From a total of 228,413 tonnes of solid waste collected daily in Brazil in 2000, only 36% ended up in a sanitary landfill.1 Almost the same quantity goes to controlled landfill sites, and the remaining solid waste is deposited in open dumps. A very small proportion goes to other destinations such as composting plants and incineration. There is no legislation to enforce the burning off of the biogas in the landfill. The practice is only to combust for security reasons to avoid accidental explosions and sometimes to reduce offensive smells.

1 IBGE statistics http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/pnsb/lixo_coletado/lixo_coletado110.shtm

Figure 1 – Cluster of Projects Analysed



This kind of project activity captures the landfill gas and flares it, sometimes producing electricity and/or heat. Some other uses are possible, for example, a new project in the pipeline proposes to use the biogas as an input to an industrial plant to produce renewable methanol.

In general, the contribution of such projects is very clear in terms of local environmental sustainability and improvements in labour conditions. The situation of open dumps is precarious regarding the environmental aspects (air and water quality) and labour aspects. It is also clear that these projects introduce both new technologies and new practices and mentalities into the waste sector. For the first time, solid waste, which is considered a big problem for municipalities, is seen as a possible source of revenue. It is interesting to note that a lawsuit has been introduced questioning the right of exploration of some sanitary landfills. The waste, which was seen as an ambient liability, is now considered an additional financial resource, which stakeholders are disputing the right to explore. For the moment this source of revenue is completely dependent on CERs, but other uses such as energy generation are being explored and in the future may become sustainable. The possibility of managing landfills as an economic resource independent of CDM is not foreseen at the moment.

The 28 landfill gas projects in Brazil, which represent 11% of the project activities in the pipeline, will contribute 30% of expected CERs until 2012. It is interesting to note that the first five projects approved in Brazil were landfill gas projects. The methodology is well established, and since the end of 2004, ACM0001 has been used in most projects. This stability and continuity in methodology has an important comparative advantage regarding other types of project. On the other hand, only towns with significant populations may have landfills big enough to justify a CDM project activity. In general, project proponents set the minimum population size of a region with a landfill for a CDM project at over 100,000 inhabitants. The design of traditional CDM methodologies is highly adapted to this kind of project, which has a great potential to develop CDM projects in all big landfill sites in Brazil. Many municipalities are interested in developing CDM projects to construct and explore landfills, with the prospect of creating a sanitary revolution in urban areas. The Ministry of the Cities has structured a pilot programme to construct landfills which have not yet succeeded in creating incentives for municipalities with a total population of more than 180,000 residents. One problem identified for this kind of project is that it is very sensible from the political point of view, as it involves different political interests. Possible further improvements would be not to flare the biogas but always to generate electricity, heat or any other possible use of it. An important barrier to be overcome is the size limit on landfills. A new stage to be reached is to extend the collection and use of biogas to smaller landfills, which could be achieved with programmatic CDM.

N_2O Projects

These projects are not important in terms of number (five projects, one adipic acid and four nitric acid). Nevertheless they are important in terms of emission reductions (21%) because of the high GWP of the N_2O, namely 3102 for CDM purposes. It also has limited possibilities for expansion because of the limited number of plants in the country. The great benefit of this kind of

2 GWP values from the IPCC Second Assessment Report (SAR) for 1995 are the ones adopted in the Kyoto Protocol.

project is in terms of its emissions reductions. The benefits in term of sustainable development are limited. Many of these projects state in "Annex III", describing the contribution of the project activity to sustainable development, that they will use some of the financial benefits from the CERs for environmental and social projects within the region of the plant. The contribution in terms of structural changes is limited, and for that reason it will not be analysed in the context of this article.

Hydro-power plants

Installed capacity in Brazil is more than 100 GW. Of this total, 76% comes from hydropower plants and only 2% from small hydropower plants.3 The CDM was a great incentive for this kind of project. Sixty-one small hydropower plants proposed have been as CDM projects in Brazil, representing 22% of the project activities in the pipeline. These projects are contributing with 14% of the expected CERs until 2012. The contribution in terms of sustainable development is evident. The government is also concerned to encourage this *type* of project. The incentive programme for renewable sources of electricity (PROINFA) was first established in 2002 and revised in 2004. Its objective is to provide incentives for wind, biomass and small hydropower plants. The Development Bank (BNDES) may finance 70% of the investment, and Eletrobrás guarantees prices for some of the energy. The additionality of projects that benefit from the PROINFA incentive is not questioned, as this type of incentive, defined as policy type –E4, is considered in the baseline scenario. In the Proinfa decree, which makes reference to its voluntary contribution to the mitigation of climate change, Eletrobrás is appointed the owner of possible CERs generated by CDM projects using PROINFA incentives. However, many projects which benefit from PROINFA were developed by private initiative without the participation of Eletrobrás as project participant. This has generated different interpretations regarding entitlement to CERs, and many project proponents are awaiting a resolution of this problem before proposing new activities in this sector. At present, projects that might apply for Proinfa incentives are going instead for the CDM exclusively.

Emissions reductions from this type of project are real and measurable and contribute in the long term to reducing emissions because the life-time of a small hydropower project is 50 to 70 years. On the other hand, it is very difficult to assess to what extent the CDM was really the main factor driving the investment decision. This kind of investment has a high risk, and all incentives to reduce the risk are welcome. CDM is just one of them. How decisive the CDM is in making investment decisions in particular projects is also difficult to assess. The additionality tool is not sufficient to assess the complexity of this kind of investment decision. Even if it is difficult to assure with total certainty that one small hydropower plant would not have been constructed without CDM, there is a consensus that CDM had a positive impact in terms of increasing the number of investors interested in small hydropower plants.

Biogas: pigs

These projects consist, in general, in changing the treatment of animal waste management systems (AWMS). Currently, pig waste is flushed from the barns and treated through sequential anaerobic lagoon management. The project activity consists

3 Under Brazilian regulations, small hydropower plants are those with between 1 MW and 30MW of installed capacity.

4 EB16 Annex 3 / Clarifications on the treatment of national and/or sectoral policies and regulations (paragraph 45 (e) of the CDM Modalities and Procedures) in determining a baseline scenario.

of covering the lagoons, collecting the biogas and combusting it. Some of these projects use the biogas to produce heat and/or electricity. This has many evident local environmental benefits because it reduces the risk of underground water contamination, bad smells and the pathogenic vectors associated with animal manure. It also improves the quality of pig manure as fertilizer. In general people who live in the area and work on the farms are very positive about the project and very cooperative with regard to the management of the system.

The additionality of this kind of project is very clear. In most of them, the only monetary benefit comes from the CERs. There are 47 projects in this category in Brazil, but most of them are bundles of small-scale projects and have already covered more than 250 farms. In terms of emissions reductions, these projects will contribute 8% of the expected CERs until 2012.

Even though this kind of project is very positive and represents tremendous opportunities in Brazil, it has faced many problems. It was first developed using methodology AM0016, which was put on hold at the 24 EB meeting. This methodology did not include monitoring of flares, and estimates of emissions reductions were not conservative. When it was replaced by ACM0010, many projects could not adapt because of the higher costs associated with the high risk of the activity, which reduced their economic viability. Projects using methodology AM0016 were concentrated in the second half of 2005 and then stopped. A second wave of pig projects started in 2006 and were developed using the small-scale methodology AMS III.D. In 2007 very few projects of this kind started validation.

Most of these projects consisted of bundling many farms in just one PDD. The project proponents are generally companies with their main business in the development and management of CDM project activities. They developed the project and proposed it to a number of farms, mostly organized in cooperatives or associations. For the farm owners, the benefits are reductions in local environmental impacts and having the heat and/or energy to be used on the farm. Project developers assume all the costs and risks and are the owners of the CERs. In some projects, farmers earn a small part of the CERs. These projects face some additional difficulties because farms can be very far away from each other and operational costs and logistics are complicated. At present not many project developers are interested in developing this kind of project due to all these hurdles.

Nevertheless it is unquestionable that the CDM is a success and has introduced structural changes in some sectors in some countries.

How the prospect of developing Programmatic CDM will impact on this kind of project is not clear. Programmatic CDM allows an unlimited and continuous addition of project activities (CPA), replicating the first one after approving the umbrella project (PoA). The idea is very interesting because it allows costs to be reduced and some projects to be scaled up, thus reducing the bureaucracy. However, other problems, like the reaction of the DOEs in assuming their role, are delaying the adoption of this new modality for CDM. A big pig-product company is developing a Programmatic CDM in Brazil. The advantage in terms of adding farms continuously is clear, but the overall perception is that the marketing associated with the trade mark was also important in the decision to go forward with this project.

This will probably be the first Programmatic CDM to be analysed in the Brazilian DNA.

In terms of the capacity to modify practices in the sector, it is clear that this practice is being incorporated as part of the modernization of these farms. There is an important gap between the traditional practices in low-intensity capital family farms and modern farms with high levels of technology. The technology for the use of biogas is not feasible for small farms. One great challenge is to extend this practice to smaller farms. The impact in the long term is positive. It is interesting to note that workers on the farms have a great interest in maintaining the systems that have already been embedded because they bring great advantages in terms of working conditions. The challenge is to interest farmers in the secondary benefits of using biogas, like the electricity, heat and fertilizers that could be produced, as well as the attractiveness of a better local environment, even if the business is very marginal in terms of the core business.

Bagasse

This kind of project activity consists in increasing the steam efficiency of a bagasse cogeneration facility and supplying the electricity surplus to the grid. This avoids dispatching the same amount of energy, which is part fossil. There are 51 bagasse cogeneration projects in the pipeline, contributing 6% of expected CERs until 2012. Most of them use large-scale methodologies. Until 2005 the methodology used was AM0015, but from 2006 onward the consolidated methodology ACM0006 was used in association with ACM0002. This stability of the methodologies available is very positive for the development of projects.

The current situation is that bagasse is used for cogeneration in very inefficient facilities, and no electricity is supplied to the grid. The high potential for energy production from the sugarcane industry was repeatedly pointed out in many studies on the energy sector. However, this potential was never utilized. There are many reasons for this. First of all, bagasse is abundant, and if it remains on the field it represents an environmental problem. Burning it in a very inefficient way is convenient because the costs are low. This consumes a lot of bagasse and generates sufficient electricity and heat for the sugarcane industry. The ability to supply energy to the grid was made possible in the new regulations for the electricity sector, but it was not sufficient for the sector to move on in this direction. There are many reasons for this. The main reason is that producing electricity is not the sector's core business. Energy production could represent 1% or 2% of the core business, namely the production of sugar and/or ethanol. Investment in high-efficient boilers and turbo-generators is not required in order to continue or increase the production of sugar or/and ethanol. Producers are not interested in going into another business (energy). They would need to supply energy on a regular basis and to comply with many technical specifications for a sector with a different logic and behaviour than in the agro-industry. It would imply significant changes for a marginal gain with many risks. Only after CDM did the sugarcane industry start to supply electricity to the grid. This is unequivocal.

The contribution to sustainable development, as stated in Annex III of the PDDs, is associated rather with the particular industry as a whole and cannot be associated directly with the project activity. Usually the industries which adhere to the CDM have better practices in terms of benefits to employees and their families,

working conditions, etc. Some PDDs state that some of the CERs will revert to local projects in the social area. But in the long term, the main contribution relates to the use of a by-product as an energy source. As everyone knows, Brazil has a very low carbon intensive energy matrix and electricity generation is based mainly on hydropower sources. What is interesting is that the dry season coincides with the sugarcane harvest season, which permits a very convenient complementarity. During the dry season the level of the water in the reservoirs has to be controlled, and this is the period when thermo-power plants are dispatched more frequently. This complementarity is positive because it reduces emissions from fossil fuels and enhances the stability of the Brazilian electricity system by adding firm energy to the system. As UNICA, the Brazilian Sugarcane Industry Association, states, the potential for power generation with bagasse in 2020 is 15,214 MW. Adding straw to the bagasse, the potential reaches 28,758 MW. So this kind of project still has a great potential as CDM project activity.

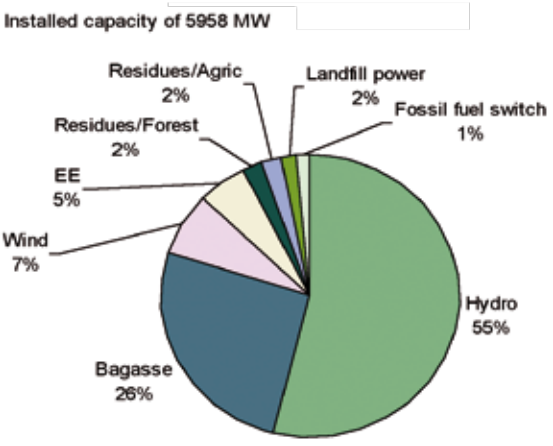
Projects which generate electricity for the grid

Many types of project generate electricity for the grid (Figure 2) or replace the energy supplied by the grid. From a total of 280 project activities, 148 generate electricity with an installed capacity of 5958 MW and emissions reductions of 81,867 t CO2 until 2012. Some of these have been dealt with in previous sections, like hydro-power and bagasse CDM projects, but some others, like wind-power plants or solar energy, were not addressed because they are not numerous. It is important to understand why these projects are not numerous and how CDM could play an important role in preventing increases in the carbon intensity of the Brazilian energy matrix.

The main source of electricity generation in Brazil is hydropower plants. This makes the emissions factor for the grid very low compared to other host countries like India and China, with a mainly coal-based matrix. Nevertheless 149 projects, more than 50% per cent of the projects in the pipeline, are for producing electricity.

Most of these projects use ACM0002 or AMS ID, which have the same rationale for calculating the emissions factor. The rationale behind the methodology, which estimates the emissions factor for an electricity system, is not adequate for a country like Brazil, which has very low operating margins because of the huge number of hydropower plants (low cost must run) generating electricity in the base. The build margin, which takes into account the most recently constructed power plants, responsible for 20% of the electricity generation in the system, does not reflect what is happening in the energy auctions. Only thermo power plants can offer the minimum price and hence win the auction and get constructed. Renewables go to the auction but do not win. Calculated in this

Figure 2 –CDM project activities generating electricity



way, the build margin emissions factor is very low for Brazil and does not represent an incentive for renewable projects. To give an idea, I will present the results from the last two auctions realized on September 2008 to decide which plants will start to generate electricity to the interconnected system. In the first auction (1,935.39 MW), all the plants that win the bid were fossil fuel: ten fuel-oil plants and two natural-gas plants. In the second bid (5,566 MW), 24 plants were (contracted?), of which 17 were fuel-oil plants, four natural gas and one coal. Only two renewable plants were contracted: one bagasse and one hydropower plant.

The CDM has had a great impact in Brazil. It has been a fabulous showroom of possible new practices in the country, like landfills with vegetation and birds, pig farms producing heat electricity, and fertilizers without bad smells using all sorts of biomass by-products to produce electricity, etc.

The trend is very clear: of the installed capacity of 101,520 MW, only 21% represents thermo power plants. Of the plants which are in construction (7,643 MW), 25% are thermo, and of those which have not started construction yet (26,981 MW), 45% are thermal power plants.

As demonstrated, Brazil has very clean electricity, but this reality is changing. The way in which ACM0002 or the "tool to calculate the emissions factor for an electricity system" is calculating the emissions factor in order to quantify the emissions reductions of CDM projects captures the inertia of the system instead of looking ahead and identifying the trend. CDM should be an incentive to reverse this scenario of increasing carbon intensity. Unfortunately this is not the case for the Brazilian electricity matrix.

Another difficulty is related to the definition of the electrical system for the grid and the emissions factors associated with this definition, which have changed in the country. Initially projects used the simple adjusted method for the operating margin and used a definition for the grid by gathering the south and the southeast/central regions into only one grid. Most of the projects that added power to the grid are located in the southeast region. When the Dispatch Centre started to calculate the emissions factor by means of the dispatch analysis, another grid definition was used, which is the common definition used by the dispatch analysis in its commercial contracts. Finally, a study was performed by the Dispatch Centre together with the Ministry of Mines and Energy and the Ministry of Science and Technology by applying the criteria proposed in the "Tool to calculate the emission factor for an electricity system" to the Brazilian electricity system. After this study, for the purpose of the CDM, the Brazilian grid was defined as only one system. What are the consequences of these definitions? As most coal power plants are in the South, the emissions factor taking the South into account becomes higher. But in fact, as the country is highly interconnected, it does not matter where the energy is produced for the logic of the dispatch.

In terms of sustainable development, it is highly significant that there is only one emissions factor for the country. This will create incentives for many projects that otherwise would not be carried out, and the energy will be available for the whole country because of the increasing interconnection. Now, for example, there will be greater incentives for wind-power projects

in the Northeast of the country, which has great unused potential, and the previous baseline emissions factor for the region was almost zero. This new baseline emissions factor associated with Programmatic CDM may help to disseminate many technologies. For example, the use of electric showers is very common in Brazil, which produces two demand peaks during the day and increase the need for firm energy. The use of solar heaters, which is almost inexistent, could be a real benefit for the country.

Finally, the projects in the pipeline that have been analysed in this paper do not yet reflect the new emissions factors, which are lower than the previous ones for some regions (South and Southeast/Center) but are higher for others (North and Northeast), which coincidentally are the less developed areas in the country.

Final Remarks

The CDM has had a great impact in Brazil. It has been a fabulous showroom of possible new practices in the country, like landfills with vegetation and birds, pig farms producing heat electricity, and fertilizers without bad smells using all sorts of biomass by-products to produce electricity, etc. In terms of structural changes, which allow the new practices that have been introduced to become common practice, the impacts differ greatly from sector to sector, but in general projects would not survive without the CDM. More research is needed to understand and explain the overall dynamic and driving forces in each sector/technology. The main aspect of the CDM was to call the attention of the production sector to the fact that from now on climate change is an important aspect to be taken into account. The perception that this new constraint can also be transformed into a new business opportunity allowing the country to grow in a more sustainable way was very important. This change in mentality and the perception of new opportunities in some sectors are the main achievements. Two main deceptions remain. As all over the world, no small-scale projects for poor communities are being developed in Brazil and almost no project activities in afforestation and reforestation. Probably CDM is not the best mechanism to develop these kinds of projects. Now in Brazil the public sector, like municipalities, ministries and agencies, is very interested in developing Programmatic CDM in many of these areas which have not yet been covered by the CDM projects, like reforestation, public transportation, energy efficiency, etc. There is an enormous need for development in the country. Climate change must not be a limitation for development and eradication of poverty. Rather, it will be an opportunity for a sustainable development, which is viable in the long term, efficient, fair and with low carbon intensity. The process is just beginning.

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Perspectives from Africa on a Reformed CDM

Abstract
The Clean Development Mechanism (CDM) has proved to be a success in generating projects to address the greenhouse gas emissions that would otherwise have occurred in developing countries. Despite Africa's growing participation in the carbon market, African projects accounted for about 4% of CDM projects by mid-2008 (UNFCCC website, August 2008). Based on the above assessment, there is a need for a special approach to CDM to ensure that Africa's participation is enhanced. The regional differences and geographical distribution identify capacity and experience as key drivers for the low performance by the rest of Africa. The countries that have attained some level of sustainable development are those that are likely to benefit from CDM, namely South Africa and North Africa. The paper examines what needs to happen to reform CDM to benefit Africa: institutional reforms, management systems and capacity-building.

Africa and the Clean Development Mechanism

Since the Kyoto Protocol became fully operational in 2005, the Clean Development Mechanism has become a multi-billion dollar source of funding for sustainable development. In his address to the 13th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Nairobi in 2007, the Secretary General of the UN, Ban Kii Moon, identified the mechanism as an 'outstanding example of a UN-led partnership linking government action to the private sector in the developing world'.

Table 1: Countries with CDM projects in Africa - by number and scale (expressed as thousands of certified emission reduction (kCER) expected in 2012).

Africa	Number	kCER2012	
South Africa	25	23850	25,3%
Egypt	9	15034	15,9%
Kenya	7	2789	3,0%
Morocco	9	2865	3,0%
Uganda	3	567	0,6%
Nigeria	3	30322	32,1%
Ivory Coast	2	6016	6,4%
Tanzania	3	2924	3,1%
Congo DR	2	2648	2,8%
Mali	2	281	0,3%
Tunisia	2	4125	4,4%
Mauritius	1	1764	1,9%
Senegal	1	784	0,8%
Mozambique	1	228	0,2%
Madagascar	1	210	0,2%
Equatorial Guinea	0	0	0,0%
Total	71	94407	100,0%

Source: UNEP Risø CDM Pipeline 1 September 2008. www.pipeline.org

Since then, the numbers show a rather slower pace of movement for Africa (see Table 1). The experience of African countries has been a steep learning curve. The opportunities are there, and, as we go into the fourth review of the Global Environmental Facility (GEF), there will be a need to ensure that Africa's specific circumstances are addressed. For this to happen, African negotiators must prepare themselves to engage with partners, developed countries and in some cases countries belonging to the G77 and China group.

Unequal geographical distribution of CDM Projects for Africa

Though the number of African countries with DNAs is high compared to other regions such as the Asia/Pacific, the number of projects is not encouraging. Most African DNAs see CDM as an opportunity to drive sustainable development. It is in this regard that the focus needs to be on sustainable development, especially if CDM project activities are to become popular in Africa. The problem with CDM so far is that it has forgotten about sustainable development and tends to award prominence to mitigation and emissions reduction.

CDM project activities are sparsely distributed across Africa (Table 2). In most cases, the lack of CDM activity is closely tied to the level of awareness of the role-players – the DNA, the private sector and the civil-society movement on climate change issues in general.

Challenges leading to low levels of CDM Activity in Africa

The review of a number of initial national communications submitted to the secretariat established that (see UNFCCC website):

- For many parties, the issue of climate change was new to them, as was their efforts in education, training and public awareness.
- Unavailability of experts and limited financial resources has caused difficulties in organizing materials for education, training and public awareness.
- The integration of climate change issues into educational curricula was recognized as crucial for the future.
- Minimal awareness and education on climate change issues among the public at large, NGOs and policy-makers.
- Many parties indicated that, in order to address climate change issues in a multidisciplinary and efficient way, they would require additional financial and technical resources to develop and train a critical mass of human resources in inventories, vulnerability and adaptation.
- The scope of training on climate change issues should be widened, to include data

Table 2

Region	KP parties	Parties with DNA	Parties with project experience	Parties with registered projects
Annex 1 parties (AI)	38	28	n/a*	17
NAI-Africa (NAI-AFR)	47	37	16	7
NAI-Asia and the Pacific (NAI-ASP)	49	34	28	21
NAI-Latin America and the Caribbean (NAI-LAC)	32	26	19	19
NAI-Other	7	8	6	3

UNFCCC website. August 2008.

and uncertainty analysis and vulnerability and adaptation assessments at both the basic and advanced levels.

Though the findings from the review of initial national communications were for all developing countries, they are also very specific to African countries.

The other reason leading to low levels of activity in CDM as a strategy for reducing global emissions of GHGs in Africa has also been the chaotic nature of responses. Most African DNAs had imagined that "CDM world" would take form of a governmental process – very formal and easy to follow.[1] What actually emerged was a CDM that was very difficult to follow, with a lot of players all vying for the different products delivered by CDM – CERs, VERs (Voluntary Emission Reductions) and, to add to the pain, a number of funding windows.

The different implementation strategies for CDM in the eyes of Africans has also led to the creation of several types of informal financial services – financiers, brokers and new financial packages – parallel to CDM, including, for example, 'the Cool Earth Partnership' and different standards being applied to CERs.

African enterprises – particularly those that are taking part in the global market and exporting various commodities, ranging from agricultural derivatives via beef, fruit and sweet corn, to textiles to mining – have already undertaken emissions-reducing activities on their own initiative, mostly to ensure that they remained competitive and did not lose their markets. Unfortunately these projects were not registered with the DNAs, so, with no baseline developed, African countries kept losing out on the opportunities that CDM was to bring. In the meantime, Africa continues to see the development of various projects, ranging from energy crops to transport to afforestation and reforestation.

Africa has a number of potential CDM projects, particularly in areas such as waste, energy efficiency and renewable energy options. The opportunities are attractive; methodologies are available, and there are also the experiences of other regions to learn from, especially South America, which African countries may draw on in developing CDM further to address their specific development needs.

1 Personal communication from the very small emitting countries, such as Lesotho, Namibia and others.

CDM for Sustainable Development: reforms necessary for Africa

A number of reforms are necessary for African countries to participate meaningfully in CDM and to ensure that CDM delivers what it was meant to.

CDM and Sustainable Development: the vital link

The UNFCCC objective (Article 2) broadly identifies two options for intervention: adaptation and mitigation. The focus in applying CDM has only been on mitigation. The only link between CDM and adaptation is the share of the proceeds of 2% of the sale of CERs as a contribution to the Adaptation Fund.

Several African DNAs define sustainable development as essentially driven by socio-economic and environmental factors. The expectation is that adaptation and mitigation will be considered in tandem and that therefore any financial mechanism must be applied to both management options.

Most governments still perceive issues of global warming and climate change as environmental concerns and therefore place greater emphasis on environmental response strategies. This means that a number of projects with the potential for benefitting from CDM do not do so. For example, waste – a potential sector for CDM – is not easily perceived as a potential energy resource. It will take a few examples to generate the catalytic effect to promote CDM as an associate measure and to use it to achieve sustainable development.

What needs to happen to achieve sustainable development?

Africa has no option but to elect sustainable development as the only vehicle of choice in meeting the challenges emanating from the vagaries caused by global warming and climate change. This choice is largely driven by the following key factors:

Carbon emissions and Africa

Africa contributes less than 4%[2] to global GHG emissions. Historically this figure has been even lower – Africa's contribution to the GHG concentrations in the atmosphere is miniscule. This also presents itself as an opportunity for clean development, but only if sustainable development were to be emphasized in the CDM. Many people in African countries rely on wood for fuel, which is used for cooking, lighting and in colder winters also for heating. There are a number of projects aimed at reducing the amount of emissions that occur as a result. One aspect remains, however: the cultural attachment to cooking with firewood. Future reforms to CDM need to recognize these cultural aspects and to relate the GHG emissions to health and the other benefits that would result.

Additionality and SD for Africa

Low levels of development mean that Africa is bound to benefit from implementing CDM project activities. At the same time, a number of projects are still challenged by the application of the CDM eligibility criteria, such as the procedures required to demonstrate the eligibility of lands for afforestation and reforestation. Since most of the African population relies on subsistence agriculture, large amounts of land are cleared for this purpose. At the same time, firewood is as a primary energy source, which means

2 World Bank Statistics, 1996. IPCC AR4.

that national baselines are low. How, then, will Africa achieve food security and implement CDM when GHG emissions from agricultural practices are significant? At the same time, Africa must develop to meet the demands of rising populations for better health, food security, improved infrastructure for roads, water and communications.

CDM and Adaptation

Global warming and climate change pose very serious challenges for Africa. Droughts, food security and extreme weather events related to climate change are already having a bearing on African economies. Climate change adaptation remains a viable option. CDM must in the future consider these realities.

Necessary CDM structural and institutional reforms to stimulate Africa's participation in CDM

There are a number of CDM reforms that need to take place to stimulate Africa's participation in CDM. The CDM process itself needs review and simplification. Currently it involves a series of complicated steps. This in itself poses difficulties and hinders Africa's participation in the CDM process.

Sustainable development and CDM

In a number of African countries, DNAs have developed or are in the process of refining their sustainable development criteria. The African sustainable development criterion typically has the following requirements: income-generation, environmental sustainability, employment-generation, capacity-building and technological development.

While it is important that sustainable development should be the goal, the output is already defined. Africa must at the same time reduce greenhouse gas emissions, otherwise the project activities will not qualify as CDM project activities. Sustainable development must therefore be a measure, not an objective, and the indicators are likely to show changes in employment levels, livelihoods and so on.

Africa has a number of potential CDM projects, particularly in areas such as waste, energy efficiency and renewable energy options.

By making sustainable development an indicator for CDM, one assumes that the components of the indicator will be measured. Who is going to do this? Should African DNAs now be verifying sustainable development for each project? And the question is, is this where we, Africa, should be devoting our energy?

Communication strategy for CDM

CDM needs to be communicated appropriately. Africa remains very vulnerable to misinformation by vendors and brokers until an appropriate communications plan has been put into effect for the continent.

The communication strategy must be driven by a capacitated DNA and local committees in place in African countries. These may *inter alia* include the national committees for the development of national communications.

The communication strategy must consider the void in environmental journalism. Most of the readership is still struggling with issues of governance, civil issues, food security and

development, to the extent that environment is relegated to almost the last priority level. The media must also be part of any communications strategy.

Institutional framework and performance systems

The current situation is therefore not the best suited for Africa. Most DNAs are therefore not active. There are a number of factors that demand institutional reform:

- The difficulty is in understanding key issues such as validation: whether or not to allow cheap projects? This is especially the case, given that the private sector is generally starved of additional resources to invest in project development and validation.
- The capacity of DNAs to participate effectively in the CDM and institutional appropriateness. Most DNAs are strongly associated with the foci of the UNFCCC, which itself happened to be anchored within the departments of meteorology, hydrology or the environment portfolio in general. The key questions are: Is this the most effective configuration? Does it matter where the anchor is? What additional capacity-building and institutional strengthening initiatives would be necessary?
- The performance of the DNAs and CDM activity are not emphasized, and nor is geographical inequity in the distribution of CDM project activities. The CDM Executive Board may be requested by the Conference of the Parties to the UNFCCC to take this challenge as a measure of the performance and effectiveness of the CDM.

The Nairobi Framework: placing a particular emphasis on Africa

The Nairobi Framework, one of the significant outcomes of the Nairobi Climate Change Conference in 2006, is a plan to support developing countries and participate in the Clean Development Mechanism, especially in Africa. The Nairobi Framework has five objectives to move the CDM forward in the beneficiary countries:

- Build and enhance the capacity of DNAs to become fully operational
- Build capacity in developing CDM project activities
- Promote investment opportunities for projects
    - Improve information sharing/ outreach/exchange of views on activities/education and training
    - Inter-agency coordination

The Nairobi Framework recognized the lack of CDM activity in Africa. Out of the total of 47 African Parties to the Kyoto Protocol, 37 have Designated National Authorities (DNAs), and of these only 16 have projects. On 14 April 2008, the global community celebrated the 1000th CDM project. The African DNAs are sitting idle – probably not yet ready to go.

Though CDM has been in place for some time, it is evident that there is still more work to be undertaken to implement the spirit of the Nairobi Framework.

Making the Nairobi Framework deliver: reforms necessary to enhance Africa's participation in CDM

Historically, CDM has placed the emphasis on carbon emissions reduction, energy efficiency and conservation, and less on sustainable development. To drive the SD agenda further forward, new methodologies must be developed, especially in those sectors where Africa has potential. This would minimize the cost associated with project development and also allow small-scale African projects to benefit from CDM. There are opportunities in transport, power transmission and distribution, and in sectors which use wood fuel.

Build and enhance the capacity of DNAs to become fully operational; capacity and critical mass concept

Currently very few people are active in discussions on climate change, CDM or carbon finance concepts. The few, usually counted in tens per country, are themselves not very well versed in these matters. The few would have benefitted from their participation as IPCC authors or participants in the UNFCCC process, and indeed may include individuals who may have also participated in the carbon forums and expositions.

In developing reforms for CDM for Africa, one necessary condition is that a critical mass must prevail. To develop and maintain a critical mass, the future CDM and DNA capacity-building programme could follow a three-step approach:

- Allow for the institutional strengthening and resourcing of DNA. This will enable DNAs to have specific and targeted resources for communication, project development, training of DNA personnel and funding the participation of additional personnel in DNA regional and international activities and programmes.
- Develop and finance a scholarship programme in local universities for students to undertake graduate climate-change studies across the main sectors. The sectors would be country-specific and should include finance and commerce, law, agriculture, water, social-sciences faculties, etc. The cost of training an African student in Africa would almost equal the cost of an airline ticket to Europe. The critical mass for this programme must be set at a minimum of twenty such graduate students. The net benefit and gain to the DNA and African countries is that the faculty is developed and the participation of Africans in the CDM process would be strengthened without necessarily being policy prescriptive.
- Allow for and facilitate skills for developing CDM project proposals through south-south cooperation and north-south exchanges. This should not only aim at academia and the private sector but also the NGO and civil society.

Promote investment opportunities for projects that enhance the role of the private sector

The annual emissions reductions from the current projects being implemented across Africa show that most of them are of small and medium scale. This apparently is also the scale of private-sector activities in Africa, except for a few countries like South Africa, for example.

In light of this reality, the role the private sector plays needs to be different and to take a different

approach. CDM is not well understood[3] by the private sector, e.g. how they may benefit not only from technology transfer, but also from carbon financing and emissions trading. In most cases, the immediate response of the private sector is to change to energy-efficient modes on their own initiative, without using the CDM window. In this way they strangle their limited financial resources and profits in fear of recriminations from government. There is also a need for Africa's private sector to acquire an improved understanding of the legal aspects related to CDM project activities. In some cases, the private sector has signed off the CER opportunity without realizing the financial incentives, thus entering into emissions-reduction purchase agreements without full knowledge.

Unlike the private sector in other regions of developing countries, in the African region the sector is limited to infrastructure and investment. In most African countries, save for a few including South Africa and some countries in North Africa, private-sector investment and project activities are short term, and the profits are minimal. Issues such as security, governance and corruption are usually singled out as reasons for this scenario. This therefore means that for African countries there are few opportunities to co-finance large-scale CDM project activities. This in itself also contributes to low levels of CDM throughput.

The challenges that face the private sector in Africa may also be viewed as opportunities for specific interventions. There is a need to enable the private sector so that it may link CDM to sustainable development and sustainable energy development objectives.

3 UNEP Collaborating Centre for Energy and Environment (UCCEE), Accra, Ghana, 1998, in cooperation with Ghana EPA, IEA, UNDP and UNCTAD and sponsored by DANIDA and UNEP.

The possible and immediate solution may be to ensure that specific funding is available to assist the private sector in African countries to recognize CDM as an incentive to achieve green development and remain globally competitive. Currently, even where the sectors are sizable, this is not the case. The private sector sees CDM as a complicated and lengthy process and also as expensive because of the validation process.

The financial sector has not been very active except for South Africa, where the Southern African Development Bank is active in the CDM market. The financial sector needs to be stimulated to see carbon finance as another way of improving the bankability of projects they are already financing, thus minimizing risks or improving security. In South American countries, the financial sector is actively involved in developing CDM methodologies to promote CDM project activities or otherwise in the trading of carbon finance accruing from CDM project activities. New methodologies could be developed for Africa's main sectors, such as public transport and firewood being replaced with solar energy, while also focusing on small-scale projects.

In setting goals for African CDM initiatives, the following issues must be considered:

- *Opportunities for Sustainable Development need to drive CDM.*
- *Removing the monkey load from CDM for SD:* Africa must ensure that sustainable development does not become a load. Currently a number of countries are insisting on SD as if to mean that the sustainable development will be monitored. This is a very heavy load for DNAs, as it is time-consuming to implement. Africa must ensure that future CDM will not commit and overstretch limited resources to evaluation.

- *Guarantee clean development*. Though the GHG emissions for development are small, there is a need to assure that Africa's future GHG emissions scenarios result in and achieve minimum GHG emissions.
- Implement CDM while also emphasizing methods to *deliver environmental and socio-economic benefits*, including improved health, increased employment opportunities, etc. However, further resources should not be spent on monitoring the benefits accruing from SD.

The future of CDM for Africa, post-2012

Given that extending the Marrakech Accords might not be a preferred option for a number of countries – especially given that this might lead to fresh negotiations – Africa may want to consider using the opportunity for the future review of the CDM. The Bali Action Plan was launched for this purpose in December 2007 (decision1/CP.13) and is meant to enable full, effective and sustained implementation. The key elements of the Bali Action Plan include:

(a) A shared vision for long-term cooperative action
(b) Enhanced national/international action on mitigation of climate change
(c) Enhanced action on adaptation
(d) Enhanced action on technology development and transfer to support action on mitigation and adaptation
(e) Enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation

The Bali Action Plan is likely to have an impact on the future of CDM in Africa. A shared vision will provide positive opportunities if, and only if, it will also open up south-south cooperation potentials without compromising the value of the CERs.

Technology transfers and CDM

The shared vision must advance adaptation through finance and technology, including national adaptation programmes of action. The shared vision must emphasize sustainable development and promote access to affordable and environmentally sound technologies, as well as ways to accelerate the deployment, diffusion and transfer of affordable and environmentally sound technologies.

Currently very few people are active in discussions on climate change, CDM or carbon finance concepts. The few, usually counted in tens per country, are themselves not very well versed in these matters.

Africa may improve its adaptive capacity through the deployment of appropriate technologies. The fourth assessment report of the IPCC indicates that the water sector is one of the key sectors that will suffer the impacts of climate change. Water needs to be sparingly used. There are opportunities to apply technologies to improved water use efficiency. CDM has yet to make use of the technology opportunities under climate change adaptation. The project activities do not directly emit greenhouse gases, but if correctly applied, these technologies can lead to emissions reduction and improved energy efficiencies. A number of programmes could be put through

an experimental phase to demonstrate this opportunity, especially in the base sectors such as water and agriculture, as Africa is vulnerable to water shortages for human consumption and agricultural production. Adaptation technology applied to these sectors will also assist Africa in improving its water efficiency and food security.

Making CDM work for Africa

The CDM rules as they are today are complex and very cumbersome to apply and therefore open up different approaches to achieving the same outcomes. What is important is to ensure agreement on what will determine our measures for effective implementation and a shared vision.

CDM needs to be extended to allow new areas, particularly where this would bring Africa on board. For example, under the CDM only afforestation and reforestation activities are eligible. For future commitment periods, CDM should be considered in connection with the process established under the CP.13 decision on "Reducing emissions from deforestation in developing countries, later known as REDD". African countries can play a significant role in reducing emissions globally if CDM is extended to recognize REDD as a CDM project activity. Deforestation is expensive to monitor, and CDM would provide the financial incentives for protection and monitoring to succeed.

The private sector sees CDM as a complicated and lengthy process and also as expensive because of the validation process.

Another strategy for making CDM work for Africa could be to allocate a share of CDM projects to Africa, for example, by setting a specific target for Africa's allocation of CDM projects. The UNFCCC Conference of the Parties may decide to set 10% or some other suitable allocation and to call for this allocation to be mainstreamed into the national programmes of Annex I parties and be reported under the national communications of Annex I parties. This would strengthen Africa's ability to achieve sustainable development and at the same time make the continent more resilient to global warming and climate change. The allocation of a CDM share to Africa must also protect Africa from being bought cheaply. A minimum price of African CERs could be instituted with provision for revision in the future.

CDM to benefit the most vulnerable

CDM must therefore place an emphasis on the following key elements: how to improve CDM for the benefit of civil society, and how to bring on board the most vulnerable, who in most cases are also in countries with very little CDM potential. In the future, CDM should look beyond project-based CDM and enhance the possibilities for programmatic approaches and project-bundling strategies.

Currently the climate change project activities that would also generate CERs do not fall within the guidelines for CDM. There are a number of CDM-like funds. The level of activity and participation in other regions of the world – South America, for example – in voluntary standards and other such initiatives signal the opportunities involved and the quest by the most vulnerable in participating in CDM-type activities. Maybe, therefore, CDM should refine its guidelines to incorporate the new and innovative carbon finance activities.

The momentum and energy for such activities need to be harnessed, and CDM can play a role in this by:

- Expanding the scope of activities allowed under the CDM.
- Defining a new role for ensuring SD through CDM by bringing on board social aspects and benefits.
- Engaging the rural development community when structuring internal trading schemes, and providing legal safeguards for communities and the environment.

In the future, CDM must therefore establish a common approach for such CDM-type activities, and at the same develop capacities in countries for these activities to happen.

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The CDM, ethics and development

Abstract
In this paper, we address the social and ethical controversies of governing the CDM for the poor. In order to explain *why* the debates are deeply polarised, we examine the key social perspectives on the mechanism and place them within fundamental debates within the social, economic and environmental sciences. We then explore the way in which CDM critiques are closely aligned with existing development thinking, identifying core narratives relating to knowledge politics, stakeholder accountability and rights-based perspectives and associated archetypical stories. In the discussion, we examine ways in which the reform of the CDM may address some of the core barriers to its acceptance.

In the run up to Copenhagen in 2009, the pressure is mounting for policy-makers to address key governance reform challenges posed by the Clean Development Mechanism. The CDM has come under criticism from many different sources – governments, local residents, and NGOs, as well as the research community. This paper focuses on perspectives from the research community, seeking to explain criticisms of the CDM in terms of longstanding and deeply rooted debates about environment and development, and examines potential reforms in terms of their ability to respond to some of these criticisms. We provide extensive references to the academic literature for those interested in understanding the origins of worldviews that are influencing the debate over the CDM.

To date, the CDM has spurred the development of more than 4000 projects in 70 developing countries.[1] These projects are expected to reduce global greenhouse gas emissions by up to 2.6 Gt CO_2-equivalent by 2012. CDM projects are at various stages of registration, validation and review in the CDM 'pipeline'. As of September 2008, more than a thousand CDM projects were registered and more than 150 were in the registration process. The majority of projects to date are large-scale methane land-fill gas projects, N_2O and renewable energy projects. The CDM is expected to generate billions of US dollars and thus also contribute to various development funds, including the adaptation fund.[2]

Discussion of the CDM often focuses on three issues: (i) the need to demonstrate that projects are truly additional (that the benefits to the climate and carbon cycle are more than what would have been the case otherwise); (ii) the requirement that projects contribute to sustainable development; and (iii) the extent to which industrial countries should meet their emissions commitments through the CDM rather than through domestic actions.[3] Although additionality and sustainable development criteria are defined within the formal CDM procedures, there are considerable ambiguities, especially in the evaluation of sustainable development benefits. Sustainable development in the CDM relates to the measurement and monitoring of a project's social, economic and ecological contributions and is currently assessed by the host country, but it is poorly defined. Additionality is also contested because of the need to establish a counterfactual story about what would have happened in the absence of the project and/or carbon finance. Debates about the role of the CDM in meeting emissions reduction targets resulted in the EU and several countries limiting the use of offsets because of concerns about ethics and technology innovation.[4]

Underlying discussions about the state and reform of the CDM are a set of more profound disagreements about the rationale and impacts of carbon trading that are linked to the theoretical, disciplinary and political perspectives of different groups of scholars and other critics. These include arguments from economics, earth science, ethics, political science and development, which often reflect very different world views. As we will show, addressing these multiple visions in the reform of the CDM is challenging, perhaps only being able to reflect those perspectives that are well grounded in previous experiences of development.

Economic perspectives on the CDM

The economic argument for offsets and the CDM is that greenhouse gases are externalities that can be addressed through regulation, taxation, and/or trading, and that emission reductions are cheaper and faster in the developing world.[5] Thus, if scarce resources are to be devoted to emissions reductions, the rational choice is to allow countries, firms, and individuals to pay for them in the developing world, where the same amount of money can buy more reductions and allow for maximum benefit at minimum cost. So, for example, an industrial country where energy efficiency is already high (such as Japan) or a sector where emissions reductions are technically difficult (such as livestock) can use offsets as a cheaper or easier way to meet its

1 UNEP (2008)

2 Boyd et al. (2008)

3 Boyd, Hultman, Roberts, et al. (2007); Wara (2006); Yamin (2005)

4 Reece, Phylipsen, Rathmann, et al. (2006)

5 Halsnæs (1996); Hepburn (2007);); Woerdman (2000)

obligations. The assumptions are those of trade in general – that trade allows for specialisation and comparative advantage – and that the CDM is therefore trade in a commodity that may be cheaper in the global south. From this economic perspective, any constraint on the use of the CDM would be a barrier to free trade and would prevent the rational use of resources. However, for those critical of trade – who see it as an unequal power game for example – this rational economic argument for the CDM is unacceptable.[6] Another critique of rational choice economics is that choices are rarely rational because of incomplete information and political, economic, psychological and cultural constraints.

A second economic issue relevant to the CDM is the controversy over the spread of market environmentalism – the concept that the best way to manage the environment is to allocate property rights to nature (including climate and carbon emissions) and to realise its value through the market and private ownership. According to this perspective, those who value environmental protection and the benefits of a stable climate or clean water will be willing to pay for these 'environmental services'. A significant number of environmental scientists and conservation organisations have seen the market as the most viable way to obtain funds to protect ecosystems.[7] Thus carbon trading is seen as a market environmentalist response to the risks of climate change – rights or permits to pollute the atmosphere are assigned (or auctioned), a cap on emissions is established to drive demand, and the market is used to buy and sell excess or needed emission credits. Critics of market environmentalism have turned their attention to the carbon markets and the CDM, variously arguing that the atmosphere is a common property resource that should not be privatised (even if only as a pollutant dump); that emissions rights have been unequally distributed (on the basis of prior pollution rather than a more equitable basis); that the true values of nature, including climate damages, are unquantifiable and unpriceable; that profits in an unregulated market can flow to unscrupulous 'cowboy capitalists'; and that private ownership is an undemocratic way to manage nature.[8]

The CDM and the carbon cycle

Earth system science would understand the CDM as part of the carbon and other global cycles, contributing to reductions in greenhouse gases within the uniformly mixed global atmosphere. For earth scientists, the primary metric of success for the CDM and other climate policies is the overall additional and measurable impact on greenhouse gas concentrations.[9] By seeing the CDM as part of the carbon cycle, earth science draws attention to the multiple opportunities to intervene in the system – by managing forests and soils, by capping fossil fuel and cement emissions, and by including the full range of greenhouse gases – but also to the tremendous uncertainties associated with measurement, interannual and spatial variability, permanence and leakage. In terms of reducing the risks of dangerous climate change, earth scientists such as James Hansen argue for much stronger regulation of fossil fuels (including a ban on coal in some cases) and might oppose carbon trading and the CDM on the grounds that, in contrast to strict caps on emissions from all countries, trading has delayed the necessary cuts and made only modest contributions to date.

6 Emmanuel and Bettelheim (1972);

7 Daily and Ellison (2002);

8 Bachram (2004)

9 Field and Raupach (2004); Steffen, Noble, Canadell, et al. (1998)

The CDM and theories of technology innovation

The CDM is often promoted as a way of transferring low-carbon technologies to the developing world, and in the case of proposals for sectoral CDM, for diverting whole economic sectors into more efficient and less fossil fuel-intensive development paths. Because a wide range of technologies are approved and proposed for the CDM, advocates and critics of its role in technology innovation argue from several different perspectives.[10] Advocates of the CDM draw on theories of innovation and energy transitions to argue that it can help to spark innovation in the developing world, but it is also possible that, by displacing carbon reductions to the developing world, the CDM reduces pressure for domestic low-carbon technologies in the north and lowers the price signal that drives innovation. Scholars who see technology choice as purely a matter of economics or technical effectiveness in reducing greenhouse gas emissions might argue that a broad range of lower carbon technologies should be included in the CDM, including nuclear and carbon sequestration and storage (CCS), whereas others concerned with risk, public perception or sustainable development issues would argue that not only nuclear should be excluded on the grounds of risk and perceptions, but also HFC capture because of questionable development and innovation value. Another perspective on technology and the CDM derives from the science and technology studies (STS) literature, which argues that technologies are not neutral but embody particular social and environmental relations, often promoted through specific discourses (e.g. narratives) and governmentalities (e.g. regulations, monitoring systems).[11] In this case, the proposals for CDM methodologies for woodstoves would come with a set of narratives about appropriate technology, poverty, gender and conservation, whereas those for large-scale wind or methane capture would carry messages about industrial development.

The CDM and international relations

From an international relations perspective, the CDM can be viewed as a north-south bargain that is critical to the success of the international climate regime because it has provided a way to reduce emissions in the south and to include the developing world in the carbon markets, while avoiding binding emissions reductions that were politically unacceptable to most developing countries. However, political theorists might differ substantially in their analysis of this bargain. Traditional state-centred approaches are uncomfortable with international agreements like the CDM, which has such heavy involvement of private, non-state actors. Political economists see the CDM through the lens of a world system in which powerful interests and countries control international relations to ensure the smooth functioning of their economies, and they would suggest that the CDM was designed to serve the needs of capital by providing cheap emission reductions, that it has a neo-colonial character or that it is biased to the interests of more powerful developed and developing countries such as China. Another perspective is that global regimes such as the CDM overlook particular national and cultural conditions, including human rights, property institutions, government systems, and views of nature.[12]

10 Grubb (2004); Dechezleprêtre, Glachant and Ménière (2008); Schneider, Holzer and Hoffmann (2008)

11 Backstrand and Lovbrand (2006); Oels (2005)

12 Weber (2001)

Ethics and the CDM

Philosophical perspectives on climate policy have traditionally focused on issues of ethics and justice, but have not for the most part directly addressed the CDM.[13] In terms of ethics, the popular critique of offsets as indulgences has some roots in ethical discussions because the fundamental objection is that paying someone else to reduce emissions rather than reducing them yourself is unethical.[14] Such ethical criticisms are of concern to corporations who seek to purchase CDM credits but at the same time are worried about the views of consumers, shareholders and the media. They seek a strong ethical defence of offsets and the CDM for their corporate social responsibility reports. There are also human rights-based arguments that can be applied to the CDM, especially in cases where the privatisation of carbon is seen to encroach on the rights of local people to land or when people are not included in decision-making about projects.[15] The latter is an example of theories of procedural justice – where the questions of who is involved in decisions are important – and can be contrasted with the numerous questions of distributive justice raised by the CDM. Distributive justice arguments emerge in the many commentaries on the unequal pattern of CDM projects – with a bias to larger developing countries such as India, China and Brazil and to certain gases and technologies – and in the distribution of local costs and benefits of projects. An alternative ethical position is that it is selfish to invest in expensive domestic emissions reductions when the CDM provides faster options for reducing climate risks, as well as side benefits to the poor in terms of cheaper energy, jobs, or health.

13 Adger, Huq, Mace, Paavola (2005);

14 Smith (2007)

15 Bond and Dada (2004)

The CDM and development

Some of the most persistent criticisms of the CDM have focused on its failure to alleviate poverty and provide local sustainable development benefits.[16] Although CDM is technically not an external development intervention, nor are CDM projects structured like a typical aid project, development theorists are still likely to see the CDM and other emissions reductions projects as a standard development project with financing from the north for technology in the south. One need only look at the 544 small-scale registered CDM projects to see how they might be linked to pressing local development priorities in the Global South.[17] International development agencies and banks have purposefully driven a campaign for 'carbon with a human face' in efforts to address poverty alleviation and technology transfer by the CDM. The World Bank, for example, was one of the first players to actively create several carbon finance funds for development in the early days of CDM development (over the long-term, financial flows from the CDM could reach up to US$50 million compared to current ODA flows, which are around US$100 million[18]). These estimated financial flows to the Global South raise new questions about how CDM finance

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16 Olsen (2007)

17 Michaelowa and Michaelowa (2007)

18 World Bank (2006)

complements or compromises existing aid flows in unanticipated ways. Some onlookers are concerned that in the early CDM gold rush the social development dimensions of this 'complex' development mechanism gained limited attention. The heady days when buyers and investors bought anything they could get their hands on are over, and investors are looking for a reformed CDM that includes quality projects that provide social development. The extensive knowledge requirements and transactions costs across layers of administrative scales have unavoidably led to accountability and transparency challenges that require reform to ensure the effective delivery of benefits to local stakeholders.[19]

From an international relations perspective, the CDM can be viewed as a north-south bargain that is critical to the success of the international climate regime because it has provided a way to reduce emissions in the south and to include the developing world in the carbon markets, while avoiding binding emissions reductions that were politically unacceptable to most developing countries.

The jury is still out on whether the CDM can deliver to the poor. What is known to date is that the CDM has primarily delivered large-scale industrial projects in two regions of the world, at times implemented without local consent or without factoring in stronger participatory mechanisms. CDM has been weak on addressing resource access or multiple objectives in forest-based pilot carbon offsets, and financially it has benefited the developers and designers of CDM projects.[20]

These early findings of CDM social impacts perhaps also fit in with various expectations that people have of failed environment-development-related initiatives and schemes. Many of the critical development perspectives on the CDM are influenced by major debates over previous development interventions. The three archetypical stories that are widely discussed in the literature are the Green Revolution in agriculture, the building of large-scale dam infrastructure, and the promotion of conservation and protected areas. These stories relate insights for a more nuanced understanding of the governance and consequences of CDM for development. We devote the rest of this paper to discussing these stories and showing how they cast light on current challenges encountered in delivering pro-poor CDM.

Development perspectives and the CDM

There are widely different perspectives on development, including modernisation theory (an evolutionary approach that saw traditional societies progress through stages of development towards a modern economy) and flows of finance and technology from north to south accelerating this process and dependency theory (where wealthy nations make poorer nations dependent on them through colonialism, unequal terms of trade, debt, and control of international relations). Other development theorists see many development projects as misguided interventions that take little account of local conditions and wishes, use inappropriate technologies, and often

19 Muller (2007)

20 Boyd, Gutierrez and Chang (2007); Wara (2007) Lohmann (2006)

provide unequal benefits within communities.[21] A positive modernising development perspective on the CDM sees offset projects as providing multiple benefits to local communities, including direct revenue, jobs, cheaper and healthier energy, and biodiversity protection. CDM projects might contribute to the alleviation of poverty and the general improvement in rural livelihoods. Dependency and other critical theorists would highlight the ways in which the CDM benefits the north more than the south, is controlled by northern interests and finance, introduces inappropriate technologies, and fosters inequality within communities.

(i) Knowledge politics and the CDM

Technology transfer is central to the future of CDM and will depend on the type of technology transfer, technology choices and investment decisions of governments and corporations. A knowledge politics lens explains how misguided development results from poor understanding of context and place.[22] The underpinning argument is that unequal power relations exist between those who possess technical knowledge and those who do not, and that this difference disadvantages local stakeholders in important decision-making processes that affect their livelihoods. This lens has been used to explain the negative social consequences of CDM projects in India.[23]

The development community has many examples of knowledge and technology transfer to the Global South. One such example is the Green Revolution – a response to famine in India and other regions of the developing world. With assistance from US aid organizations and international scientists, a program began of plant-breeding, irrigation development and agrochemical financing – a package of technologies designed to increase crop yields. This revolution has contributed to raising Asian per capita food production by 27% and making India food self-sufficient to the extent that 'no one sleeps with an empty belly', but it has also come under a great deal of scrutiny. In particular, failures to prioritize agrarian reform over technological solutions have lead to poor people being locked into rural debt by having to purchase inputs. Success has largely been dependent on access to credit and land. On the environmental impacts, there has been a reduction in agricultural diversity and biodiversity due to a reliance on a few high-yield crops and the expansion of agricultural monocrops. Subsidy programs have contributed to the inappropriate use of inputs and the resource degradation that could be contributing to the declining rates of growth in crop yields.[24] The Green Revolution was seen to increase inequality in communities as the better off gained access to the new projects and the poorest were excluded and as women were excluded from training and other benefits and struggled with the ecological impacts of inputs, fertilizers and loss of biodiversity.[25] The Green Revolution has polarized the western environmental lobby, scientists and policy-makers in the Global South. Western NGOs have been accused of taking a 'elitist' view of poverty in the Global South, yet more recently, scientists acknowledge that some billion people are still undernourished and lack food security and are calling for a second revolution as a response.[26] The CDM has some parallels to the Green Revolution in the transfer of technologies to poor households,

21 Willis (2005)

22 Fairhead and Leach (1995)

23 Lohmann (2008)

24 Wichelns (2004)

25 Sobha (2007)

26 Lynch (2007)

the need for technical knowledge and assistance to implement successful emissions reductions, and the potential to create social and gender inequalities.

(ii) Stakeholder accountability and the CDM

Although not an intervention per se, as a project vehicle the CDM struggles with inconsistencies between the idea connected with pro-poor CDM that it is supposed to include consultation with local people and the actual practices of delivery. Accountability perspectives in development highlight the need for transparent and legitimate standards, procedures and stakeholder engagement in development planning and the execution of development projects. One of the most controversial experiences of the development community concerning accountability has been the experience with the construction of large dams and water management projects. Between 1950 and 1990, the World Bank and other development agencies focused finance on the construction of large infrastructural projects in the Global South, including numerous large dams such as the Volta, Aswan and Three Gorges. Among the many criticisms of these large projects was the lack of consultation of local people, who were often relocated and whose livelihoods were affected by the dams and reservoirs.[27] In response, in 2000 the World Commission on Dams delivered a report that called for the screening of large projects and transparency in dam-related decision-making processes.[28] Scholars have noted the importance of consensus-building among those impacted by the construction of big dams and are urging that greater emphasis be placed on the way that peoples' values, expectations and political allegiances change over the lifetime of a dam project in order to identify which important assumptions are built into the stakeholder structures, and the types of knowledge that exist between experts and lay persons.[29] While the CDM community turns to consider broad governance reforms to the operational procedures for CDM validation and verification, the issue of accountability regarding social sustainability remains a challenging one, and there may be lessons to learn from the experience of large dams. This is particularly the case in contexts where there are discrepancies between national sustainable development criteria, validation and project implementation.

(iii) Rights-based forest perspectives and the CDM

The final example of the legacies of previous development experiences is that of prior attempts at forest conservation and its implications for any consideration of forestry within the CDM. Any CDM project in the land use and forest sector is likely to encounter methodological challenges in establishing baselines proving additionality and leakage, as well as in how to ensure a functioning long-term institutional governance framework. A long tradition of research in forest governance has revealed numerous problems with forest projects being driven by northern interests or implemented with insufficient attention to local ecology, culture and land rights.[30] Rights-based perspectives draw insights from other forest initiatives, in particular Integrated Conservation and Development Projects (ICDP). ICDPs emerged in the 1980s and were specifically aimed at tackling non-participatory approaches to conserving national parks. The number of ICDPs rose from 20 in the

27 Goldsmith and Hildyard (1985)

28 World Commission on Dams (2000)

29 Lockie (2007)

30 Gibson, McKean and Ostrom (2000);

1980s to 300 in the early 2000s. They are also known as community-based natural resource management (CBNRM) and are often concerned with providing employment by ecotourism and sustainable livelihood alternatives. Above all, these schemes aim to avoid the threat of local development on biodiversity conservation. However, ICDPs have struggled to gain credibility due to predefined (mostly scientific) external priorities set by conservation organisations and national governments, alongside the exclusion of minorities such as women and landless. It is often the case that unpopular agricultural options are provided where local people want cattle and credit to build up capital. The costs and risks of engaging in local development, such as land tenure planning, can be time consuming and off-putting for some conservation organisations. A recent evaluation of community-based forest management in Nepal shows that poor communities still gained little from a long-term programme funded by Australian aid finance.[31] Similarly, some show that, without gaining a clear understanding of intra-community dynamics and of community members' perceptions of external groups, the design of appropriate strategies for collaboration in forest management is likely to fail.[32] Recently findings suggest that conservation and development programs can positively affect people if they mainstream outreach efforts that address the particular localized manifestations of health problems such as HIV/AIDS in the context of natural resource management.[33] In revisiting forests and land-use change under a post-2012 agreement, the rights-based perspective is certain to be present. Already discussions on Reduced Emissions from Avoided Deforestation have sparked a response from civil society regarding the negative impacts of REDD projects on local peoples.

31 Thoms (2008)

32 Horowitz (2008)

33 Demotts (2008)

Can the CDM respond?

How may an improved CDM satisfy the critics as outlined in the six perspectives? While important lessons can be drawn from previous experiences in development, the range of perspectives discussed in the first part of the paper means that it is well nigh impossible for a reformed CDM to satisfy some of its critics, especially where scholars have very different and deeply rooted views of economics, ethics or the structure of international relations. For earth scientists, a reformed CDM would need to ensure additional and significant interventions in the carbon cycle so as to reduce the risks of climate change more rapidly, perhaps including a broader range of greenhouse gases. Economists focused on the most efficient CDM might propose dropping the sustainable development criteria in favour of a focus on carbon alone. Some theorists of technology innovation might prefer sectoral and policy CDM that would promote large-scale sociotechnical transitions. Ethical debates might clarify decisions about the proportion of emissions reduction obligations that should be made through offsets.

In terms of ethics, the popular critique of offsets as indulgences has some roots in ethical discussions because the fundamental objection is that paying someone else to reduce emissions rather than reducing them yourself is unethical

Development theorists might propose a CDM which gives greater weighting to poorer countries and ensures a more equitable participation and distribution of benefits within communities. As CDM moves from the frontiers of the 'wild west' to a mature market, the focus of market players is shifting increasingly towards high-quality CERS with sustainability co-benefits as criteria. CDM reform includes the new kid on the block – Programmes of Activities (PoAs). These integrated and scaled-up projects open up hope for new opportunities for small-scale projects and should in theory act as an incentive for the delivery of sustainable development to low-income communities. Examples include rural lighting in India, energy retrofitting and small community waste treatments. Although Programmes of Activities are creative, they are presently confronted with a multitude of challenges, such as unclear methodologies and sampling norms, EB discrepancies and reluctant validators. The development perspectives in this essay illustrate that the CDM community faces the dual challenges of accommodating plural perspectives and practical operational issues. One of the most important tests for the community will be to avoid polarisations around CDM reform and keep the process moving forward.

In this paper, we have discussed some of the underlying theoretical and political perspectives that may underpin debates about the CDM and have shown how past experiences of environment and development may foster scepticism about the sustainable development benefits. It is, however, important to note that the theoretical critique and evaluation of large dams, the Green Revolution and conservation projects are supported by several decades of careful empirical studies that have included fieldwork by independent researchers to understand under what conditions these projects succeed and fail. As yet we do not have this accumulated body of work on the CDM, and careful comparative and data rich studies are needed to understand under what conditions the CDM contributes to sustainable development and rapid emissions reductions.

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References

Adger, W., Huq, S., Mace, M. and Paavola, J. 2005. Equity and Justice in Adaptation to Climate Change. MIT Press, Cambridge.

Bachram, H. 2004. Climate fraud and carbon colonialism: the new trade in greenhouse gases. Capitalism Nature Socialism. 15(4):5-20.

Backstrand, K. and Lovbrand, E. 2006. Planting Trees to Mitigate Climate Change: Contested Discourses of Ecological Modernization, Green Governmentality and Civic Environmentalism. Global Environmental Politics. 6(1):50-75.

Bond, P. and Dada, R., ed. 2004. Trouble in the Air: Global Warming and the Privatised Atmosphere. Durban SA: Center for Civil Society.

Boyd, E., Gutierrez, M. and Chang, M. 2007. Small-scale forest carbon projects: adapting CDM to low-income communities. Global Environmental Change. 17(2):250-259.

Boyd, E., Hultman, N., et al. 2008. Reforming the CDM for sustainable development: lessons learned and policy futures. Environmental Science and Policy. (under revision).

Boyd, E., Hultman, N., Roberts, T., Corbera, E., Ebeling, J., Liverman, D., Brown, K., Tippmann, R., Cole, J. and Mann, P. 2007. The Clean Development Mechanism: an assessment of current practice and future approaches for policy. Tyndall Working Paper. Environmental Change Institute Oxford, Tyndall Centre for Climate Change Research in cooperation with EcoSecurities. http://www.tyndall.ac.uk/publications/working_papers/twp114.pdf

Daily, G. C. and Ellison, K. 2002. The New Economy of Nature: The Quest to Make Conservation Profitable. Island Press.

Dechezleprêtre, A., Glachant, M. and Ménière, Y. 2008. The Clean Development Mechanism and the international diffusion of technologies: An empirical study. Energy Policy. 36(4):1273-1283.

Emmanuel, A. and Bettelheim, C. 1972. Unequal exchange: a study of the imperialism of trade. Monthly Review Press.

Fairhead, J., and Leach, M. 1995. False forest history, complicit social analysis: rethinking some West African environmental narratives. World Development Vol. 23:6 (1023-1035).

Field, C. and Raupach, M. 2004. The Global Carbon Cycle: Integrating Humans, Climate, and the Natural World. Island Press.

Gibson, C., McKean, M. and Ostrom, E. 2000. People and Forests: Communities, Institutions, and Governance. MIT Press.

Goldsmith, E. and Hildyard, N. 1985. The Social and Environmental Effects of Large Dams. San Francisco (USA): Sierra Club Books.

Grubb, M. 2004. Technology Innovation and Climate Change Policy: An Overview of Issues and Options. Keio Economics Studies. 41(2):103.

Halsnæs, K. 1996. The economics of climate change mitigation in developing countries. Energy Policy. 24(10-11):917-926.

Hepburn, C. 2007. Carbon Trading: A Review of the Kyoto Mechanisms. Annual Review of Environment and Resources 32(375).

Horowitz, L.S. 2008. "It's up to the clan to protect": cultural heritage and the micropolitical ecology of conservation in New Caledonia. Social Science Journal. Vol. 45: 2, 258-278.

Lockie, S. 2007. Deliberation and actor-networks: the "practical'' implications of social theory for the assessment of large dams and other interventions. Society and Natural Resources. Vol.20: 9, 785-799.

Lohmann, L. 2006. Carbon trading: a critical conversation on climate change, privatisation and power. Uppsala Dag Hammarskjöld Foundation.

Lohmann, L. 2008. Carbon Trading, Climate Justice and the Production of Ignorance: Ten Examples. Development. 51(3):359-365.

Lynch, JP. 2007. Roots of the second green revolution. Australian Journal of Botany. Vol. 55: 5, 493-512

Michaelowa, K and Michaelowa, A. 2007. Special Issue: Climate or Development? Climatic Change. Vol. 84:1, pp. 1-111.

Muller, A. 2007. How to make the clean development mechanism sustainable: the potential of rent extraction. Energy Policy. 35(6):3203-3212.

Oels, A. 2005. Rendering climate change governable: from biopower to advanced liberal government? Journal of Environmental Policy & Planning. 7(3):185-207.

Olsen, K. 2007. The clean development mechanism's contribution to sustainable development: a review of the literature. Climatic Change. 84(1):59-73.

Reece, G., Phylipsen, D., Rathmann, M., Horstink, M. and Angelini, T. 2006. Use of JI/CDM credits by participants in phase II of the EU ETS. London: ECOFYS. http://www.wwf.org.uk/filelibrary/pdf/ecofys_271006_report.pdf

Schneider, M., Holzer, A. and Hoffmann, V. H. 2008. Understanding the CDM's contribution to technology transfer. Energy Policy. 36(8):2930-2938.

Smith, K. 2007. The Carbon Neutral Myth-Offset Indulgences for your Climate Sins. http://www.carbontradewatch.org/pubs/carbon_neutral_myth.pdf

Sobha, I. 2007. Green Revolution: Impact on Gender. Journal of Human Ecology. Vol 22:2, 107-113.

Steffen, W., Noble, I., Canadell, J., Apps, M., Schulze, E., Jarvis, P., Baldocchi, D., Ciais, P., Cramer, W. and Ehleringer, J. 1998. The terrestrial carbon cycle: implications for the Kyoto Protocol. Science. 280(5368):1393-1394.

Thoms C.A. 2008. Community control of resources and the challenge of improving local livelihoods: a critical examination of community forestry in Nepal. Geoforum. Vol. 39: 3, 1452-1465.

UNEP. 2008. Risoe CDM/JI Pipeline Analysis and Database, October 1st 2008

Wara, M. 2006. Measuring the Clean Development Mechanism's Performance and Potential. Stanford University, Program on Energy and Sustainable Development, Working Paper. http://iis-db.stanford.edu/pubs/21211/Wara_CDM.pdf

Wara, M. 2007. Is the global carbon market working? Nature. 445(7128):595.

Weber, C. 2001. International Relations Theory: A Critical Introduction. Routledge.

Wichelns, D. 2004. The impact of public policies on the sustainability of rice and wheat production on the Indo-Gangetic plains. Journal of Sustainable Agriculture. Vol. 23:3, 67-92.

Willis, K. 2005. Theories and Practices of Development. Routledge.

Woerdman, E. 2000. Implementing the Kyoto protocol: why JI and CDM show more promise than international emissions trading. Energy Policy. 28(1):29-38.

World Bank 2006. State of the Carbon Market. Washington: World Bank.

World Commission on Dams 2000. Dams and Development: A New Framework for Decision Making. http://www.dams.org/

Yamin, F. 2005. Climate Change and Carbon Markets: A Handbook of Emission Reduction Mechanisms. Earthscan.


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Does the CDM need an institutional reform?

Abstract:
This article deals with the present project-based CDM from a governance perspective. In terms of volume and numbers, the CDM seems to have met the expectations of the political system. The question is whether it is sufficiently adapted to this success and potential expansion. A number of private stakeholder suggestions and options presently discussed by government representatives preparing for COP 15 are analysed. The article identifies as an important issue that powers, which in other regulatory systems would typically be divided, are concentrated at the Executive Board level in the CDM system. In conclusion, it is suggested - as a package - to move towards more top-down standardization of methodologies, to strengthen standard setting and supervision of DOEs and, as an institutional change, to introduce an appeals system for cases of registration and issuance while at the same time abolishing the review procedures.

This article looks at the Clean Development Mechanism from a governance perspective. It will refer to some governance theory but it is not meant to be scientific, since I am no governance expert, nor is it meant to solve everything. It attempts to give some answers to the question how governance of the CDM might be improved and whether any such improvements might imply institutional changes.

In creating the CDM, the UN system has actually succeeded in building up the framework for a market mechanism that works in spite of its imperfections and fosters significant financial flows to environmentally sensitive projects in developing countries. That in itself comes close to a miracle. But even miracles can be improved on. A lot of effort is continually being made, not least

** the essay represents the authors' personal views and not necessarily the position of the Government of China or the National Climate Change Coordination Committee Secretariat,*

by the Board, in order to transform the lessons learned and experience gained into improved manageability and transparency of the present system, aiming to ease the ability of the stakeholders involved to manoeuvre and at the same time ensure the required environmental integrity. It has to be born in mind that the CDM has only been fully operational for a relatively short period since the Kyoto Protocol came into force in early 2005.

The private sector and other stakeholders have been very active in providing contributions on how to improve the system. Some of them are reflected in this article, as are a number of suggestions and options presently being discussed within the framework of the Ad Hoc Working Group for Further Commitments for Annex I Parties under the Kyoto Protocol (AWG KP).[1]

The article is based on my personal experience from having served for six years on the CDM Executive Board, on countless formal and informal discussions with stakeholders, and, hopefully, on some common sense. The focus will be on the existing project based CDM governance system as this has developed so far[2] and within that context on the basic functions of the Executive Board, this being the core body of the system.

First, the article will define governance and assess the achievements of the CDM in terms of the number and volume of projects that have been generated or are under preparation. The powers granted to the Executive Board and the style of regulation are then analysed. Based on this analysis, improvements to the existing governance system of the CDM are discussed. Finally, the article concludes by suggesting – as a package – more top-down standardization of methodologies, strengthened supervision of DOEs and introduction of an appeal system for registration and issuance cases with, as an institutional change, an independent appeal body.

2. Governance and the CDM

The World Bank broadly defines governance as 'the exercise of political authority and the use of institutional resources to manage society's problems and affairs'.[3] More specifically, governance relates to decisions that define expectations, grant power or verify performance.

The expectations of the political system is that the CDM as it is designed will deliver the public goods expressed in its objectives in the shape of real, measurable and additional reductions and the promotion of sustainable development, i.e. output legitimacy.

Power is granted to institutions by the Kyoto Conference of Parties (COP/MOP or CMP), with the Executive Board in a core role and with Board-accredited validators and verifiers (Designated Operational Entities, DOEs) and nationally appointed Designated National Authorities (DNAs).

The institutions exercise their powers as basically regulated in the Modalities and Procedures of Marrakech (who does what) in a certain style of regulation (how is it done). Taken together, the institutional framework, the regulatory system and the style of regulation determine the ef-

1 [1] See the compilation in doc. FCCC/TP/2008/2 sect. III.A (http://maindb.unfccc.int/library/view_pdf.pl?url=http://unfccc.int/resource/docs/2008/tp/02.pdf)

2 The article does not deal with suggestions to extend the scope and scale of the CDM into e.g. sectoral concepts, nor does it deal with market implications as such or suggestions to directly or indirectly influence market penetration of CERs.

3 World Bank 1991, 'Managing Development: The Governance Dimension', Washington D.C.

ficiency of the system, not least in terms of the transaction costs involved.

The incentive for the private sector to participate voluntarily is a positive sanction by the system in the form of the issuance of tradable credits corresponding to verified reductions (CERs). The way in which the regulatory system and the style of regulation represents the roles, interests and rights of participating stakeholders determines the input legitimacy.

There is no systematic verification on a qualitative basis of the performance of the CDM system. There is, however, broad statistical coverage of the development of the CDM, provided in particular by UNEP Risø.[4]

3. Achievement of expectations so far

The number of projects and the volume of investments are important although not exclusive indicators of output legitimacy.

As of 1 September 2008, more than 3800 projects are in the pipeline,[5] including 1152 registered projects. In total up to 2012 they are expected to yield 1.5 billion CERs.[6] With a price of, for example, USD 20 per CER, USD 1.5 billion will become available for adaptation through the CDM (2% share of proceeds).

The steady flow of projects entering the pipeline, in the order of 120 per month, might be seen as an indicator of continuous private-sector interest and possibly of confidence in the system as it has actually been designed and is developing.

The CDM, being a bottom-up mechanism, very much represents a carrot style of regulation.

Another way to assess the success of the CDM is to look at the significant investment flows into CDM projects. According to a 2007 UNFCCC report on investment and financial flows, the capital that will be invested in CDM projects registered during 2006 is estimated at about USD 7 billion. The estimated investment in renewable energy and energy-efficiency projects of USD 5.7 billion is roughly triple the official development assistance support for energy policy and renewable energy projects in the same countries. The capital that will be invested in projects that entered the CDM pipeline during 2006 is estimated at over USD 25 billion. In comparison, the total investment leveraged through the Global Environment Facility (GEF) in the area of climate change since it started is USD 14 billion.[7]

The present and expected volume of the CDM does not reflect a corresponding north–south

4 See statistics provided by UNEP Risø http://cdmpipeline.org/

5 This figure should be reduced by approximately 20% to take into account projects that are expected not to pass validation or to be rejected.

6 The total expected number of CERs accumulated up to 2012 according to project information will be approximately 2.75 billion. The figure quoted of 1.5 billion takes into account an estimated 40% reduction due to the reduced number of projects actually registered (cf. previous footnote) and a some postponing of issuance relative to performance.

7 For details, see Dialogue working paper 8, paragraph 41. See http://unfccc.int/files/cooperation_and_support/financial_mechanism/financial_mechanism_gef/application/pdf/dialogue_working_paper_8.pdf and the Carbon Markets chapter of the background paper. http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/potential_of_carbon_matkets.pdf

transfer of new technology, since many projects so far have been registered without the involvement of foreign investment other than the purchase of CERs. The expectations of the political system – that sustainable development be promoted – are accommodated merely by definition, since confirmation thereof is the prerogative of parties to that same political system (the DNAs).

In summary, it seems that expectations are being met and that the CDM can be considered a success in terms of numbers and volume and hence in assisting Annex I to achieve compliance. The question is whether the governance of the CDM and its institutional set up has been sufficiently adapted to this success and to a situation where there is a potential for even more projects to pass through its system in the future.

4. Powers granted to the Executive Board

The Board is super-ordinate within the mandate given by the CMP in the Modalities & Procedures (M&Ps) and in subsequent CMP decisions and guidance. Together with its support structure, the Board constitutes the centralised level of the governance system of the CDM. The DOEs act on a decentralised level, but as part of the centralised decision-making process. The DNAs exercise their specific national functions on the decentralised level.

According to the M&Ps, the Executive Board takes the basic decisions necessary for the further implementation of the system. Hence, it has regulatory as well as executive functions.
As a regulatory body, the Board adopts material rules as well as procedural rules.

Material rules are the baseline and monitoring methodologies that constitute the basic eligibility requirements, including guidance and clarifications on how methodologies are to be understood. Methodological tools, such as the additionality tool, are not binding as such unless they have been incorporated into an approved methodology. However, they represent standards which are accepted by the Board. Thus the Board provides the conditions to be met in order for the project participans ultimately to achieve CERs.
The procedural rules comprise, e.g., procedures for the approval and revision of methodologies, the accreditation, supervision etc. of DOEs, the submission of requests for registration and issuance, the review of such cases and the administration of the CER registry. In general, the Board provides procedural rules that govern participation in the administrative process, communication top-down and bottom-up, the decision-making process itself and any administrative review of decisions.

In its executive function, the Board accredits DOEs, registers projects on the basis of DOE validations, issues CERs, governs the CER registry and decides its own budget and support structure through the Management Plan (MAP). Registration and issuance take place automatically upon submission or request by the DOEs, unless the Board itself decides to exercise its right to undertake a review, which will conclude in final registration or issuance (with or without corrections) or in final rejection. By deciding to undertake a review, the Board exercises a quasi-judicial function in the sense that it contests the assessment of the conformity of the specifics of a case with the material rules that has been undertaken by another official body of the decision-making process accredited for that function, i.e. the DOE.

The Board is composed of ten members and ten alternates, in practical terms working as a team of twenty, elected in their personal capacity by the

CMP for two-year terms with the possibility of re-election. They are expected to possess appropriate technical and/or political expertise. Candidates are nominated by the regional groups of the UN system plus by Annex I and non-Annex I respectively. Thus, of the twenty, twelve are from developing countries and eight from developed countries. The chair and vice-chair are, according to the M&Ps, elected by the Board itself for one-year terms alternating between Annex I and Non-Annex I representatives.

At present, the meeting time alone amounts to approximately eight weeks per year. In addition, considerable time is spent preparing for meetings, exercising special functions on the Board itself or in panels and working groups etc. In its report to CMP-3, the Board has noted that presently there is no remuneration or compensation for this dedication of time.[8] The nomination process and the working conditions favour, in general terms, the election of government employees, most of whom belong to their national negotiation teams.

Since early 2007, the CDM has been self-financing in practice, mainly through shares of the proceeds of issued CERs (initially paid as registration fees). This has given the Board control over resource allocations to the secretariat and over the development and implementation of an appropriate support structure. To assist the Board in accomplishing its tasks, it has set up several subcommittees or panels (presently the Accreditation Panel, Methodologies Panel, Deforestation & Reforestation Working Group and Small-Scale Working Group) as well as a Registration and Issuance Team (short RIT). Through the Secretari-

8 Members and alternates are granted a daily subsistence allowance that is 40% more than the standard UN rate. Cf. decision 7/CMP 1 paragraph 17.

Table 1

Stick, carrot, and sermon styles of regulation.

	The stick style of regulation	**The carrot style of regulation**	**The sermon style of regulation**
Regulatory logic	Command and control	Incentives (mostly economic)	Information and inducement
Role of regulator	Decides and enacts binding standards and rules	Set out structures of incentives	Provide information and encourage certain actions
Role of regulated	Freedom of choice is delimited by regulatory acts	Voluntary, calculated choices based on incentive structures	Voluntary choices subsequent to the information and sermons available
Strengths	High certainty of compliance and standardised effects on regulated actors	Use of regulated actors' personal utility functions and knowledge	Use of regulated actors' personal utility functions and knowledge
Weaknesses	Potentially rigid, inflexible and expensive	Uncertainty about effect caused by reliance on individual calculus	Uncertainty about effect caused by reliance on individual calculus

Source: Ole Helby Petersen 2008: 'Theorizing on Public-Private Partnerships: Regulatory Regimes, Credible Commitments and Social Trust', International Center for Business and Politics (working paper).

at, these assist EB members to address validation and verification issues. The chairs and vice-chairs of expert panels and working groups are selected from among Board members and alternates in order to ensure appropriate interaction.

5. The CDM and different styles of regulation

Regulation is part of any system of governance. As shown in the following table, generically different types of regulation have different implications for the roles of the regulator and the regulated and different strengths and weaknesses. The CDM, being a bottom-up mechanism, very much represents a carrot style of regulation.

From a broader governance perspective, the stick style of regulation can be the most efficient and provide the most output legitimacy. The carrot style might be less efficient, but on the other hand it ensures more input legitimacy. The sermon style might be least efficient but ensures input legitimacy. Hence, legitimacy and efficiency concerns are interdependent and at the same time often in conflict with each other.

6. Improving governance of the existing CDM

In this section, some key elements will be discussed regarding further improvements to the CDM governance system, with a particular emphasis on the core elements of the existing CDM, i.e. methodologies, accreditation, and registration and issuance. The focus will be on the balance between legitimacy and efficiency.

6.1. Standardizing of methodologies

From the point of view of project developers, it has been claimed that clarity over rules is an overarching prerequisite in order to attract investment. Clarity prevents the risk that projects will be deemed ineligible or that eligible projects will receive fewer credits than estimated. Risks tend to make investment unattractive, especially since capital needs to be deployed before actual approval of registration and issuance.[9]

In response, the Board has continually simplified and clarified various procedures by adapting them to lessons learned, experience gained and development of the mechanism in general. Examples are the extension of the grace period for use of an older version of a revised methodology to eight months, and the streamlining and encouragement of interactions between project developers and the secretariat on methodology issues. The Board also follows up with frequent guidance and clarifications.[10]

At the same time, the Board has consolidated a number of methodologies. The consolidated methodology for grid-connected electricity generation from renewable sources, for example, covers technologies or measures such as solar, hydro, tidal, wave, wind and geothermal,[11] which makes it the most widely applied methodology, used in more than 40% of all projects registered.

Also, standardizing methodologies adds to clarity, and the Board has developed seven generic tools so far,[12] including the additionality tool and

9 Presentation by Forrister at IETA side event on CDM at SBs, 11 June 2008.

10 See for examples the 2007 EB-report, paragraphs 37, 74 and 83, on guidance to project developers.

11 ACM0002.

12 The "technical" tools cover calculation of the emissions factor for electrical systems, calculation of project- or leakage-related CO2 emissions from fossil fuel combustion, calculation of project emissions from electricity consumption, determination of methane emissions avoided from dumping waste at a solid-waste disposal site, and determination of project emissions from flaring gases containing methane.

the combined baseline and additionality tool, referenced to in more than fifty methodologies. It is claimed that there is a lingering uncertainty about additionality, since it leaves it to the project participant to prove that the project in question is not a business-as-usual project. The additionality tool was first issued in October 2004. Since then it has been developed further by the Board, as practical experience was gained until the last update in August 2008. It is generally considered valid and helpful as top-down guidance.

Among the options suggested in the AWG KP, one is to allow the Board to pre-approve parameters or procedures to define a (conservative) standardized baseline for certain types of project activities, e.g. a benchmark or deemed value for a specific energy-consuming appliance or activity. A list could be established of project activity types that need or need not demonstrate additionality individually. A remaining task would be to ensure that the CDM is not applied in the implementation of policies etc. which would be implemented anyway. Ways of ensuring this could be to determine default subtractions of CERs to be issued or developing dynamic baselines to take into account the performance of CDM projects already implemented within that policy framework.[13]

In order to promote a more equal geographical distribution of projects, another option suggested in the AWG KP is to remove the requirement to demonstrate additionality for small-scale projects in specific host countries such as Least Developed Countries (LDCs) and Small Island Development States (SIDSs). Alternatively the costs of the validation and verification of such projects could be exempt from paying a share of proceeds for administration.

In the AWG KP the concern is raised about the DOEs assessing projects on behalf of the regulatory system while at the same being commercially connected to the project developers.

The conclusion to the above seems to be that project developers prefer even more hierarchy than is presently provided through voluntary exchange (sticks instead of carrots). At the same time, the political system is discussing options for further standardizations and further ways of simplifying the additionality requirements without jeopardizing environmental integrity.

Consequently the Board could be formally mandated to provide top-down methodology tools and standardization covering, e.g., renewable energy activities, demand-side energy efficiency, transport, agriculture, afforestation and reforestation, and other relevant areas. The CMP has already asked the Board to continue its efforts to broaden the applicability of methodologies.[14] The Board could ask the secretariat to prepare relevant proposals (which to some extent it does already), involving external consultants and project developers organized in a representative way.

In particular, tools could serve as building blocks for new approaches. In parallel, the traditional bottom-up approach should be maintained, al-

13 See as an example ACM0013, "Consolidated methodology for new grid connected fossil fuel fired power plants using a less GHG intensive technology". In approving the methodology, the Board noted that the specifics of the methodology ensured amongst other things that the potential for the application in a particular geographical area would decrease as more such projects are registered under the CDM (EB 34, para. 16 . http://cdm.unfccc.int/EB/034/eb34rep.pdf).

14 Decision 2/CMP.3 para. 18 (b).

lowing for new ideas and concepts to be fed into the process. However, such ideas should not be fully developed by project participants but could be communicated to the Board for further development in a top-down mode. The Methodologies Panel continues as the expert advisor of the Board.

The described model will most likely increase costs at the Board level. On the other hand, it will be seen as desirable by project participants and will involve less cost at that level. Thus, it might be neutral in terms of transaction costs (efficiency) while at the same time increasing both input legitimacy and compliance certainty and quality (output legitimacy).

The only option will be to abolish the present review procedure and let the DOEs' assessments be final, i.e. projects are registered and credits issued upon positive validation or verification by DOEs unless they are appealed against to the new body

In the AWG KP, discussions are also being carried out into if and how objectives such as the promotion of sustainable development, the achievement of environmental and economic co-benefits and the transfer of technologies might be concretized by specific eligibility criteria. Implementing such concepts would necessitate the inclusion in methodologies of appropriate definitions and relevant criteria and indicators. A considerable effort would be needed to formulate these requirements in a sufficiently standardized way in order to maintain clarity and efficiency.

6.2. Setting standards for accreditation and validation/verification services

The number of cases where projects or credits are not automatically registered or issued because a review has been triggered by three Board members has substantially increased since spring 2007. The main reason is the availability in early 2007 of adequate Secretariat resources to support decision-making by Board members and the quality management control system put in place by the EB.[15]

This development has revealed some discrepancies in the perceptions of quality requirements between the Board and the DOEs. Consequently, all categories of stakeholders have expressed concern about the legitimacy and efficiency of the system.

Procedurally, the Board's decisions to undertake a review take into account inputs from the secretariat, including the view from an outside expert (RIT). They also take into account comments that project developers and DOEs are invited to submit on the basis of requests for review. If a review is decided, its specific scope is determined, and project developers and DOEs have the right to submit their views once again.

A final decision has to be taken at the second Board meeting after the requests have been made. This means that registration or issuance is not delayed by more than a couple of months. Nevertheless, responding to the questions raised and possibly undertaking corrections might involve additional unforeseen costs for DOEs and project developers.. In the view of the private sector, reviews are seen as setbacks for predictability and manageability. On the other hand, the Board is ultimately responsible for the quality of the

15 2007 EB-report paragraph 91 (d).

projects registered and, if in doubt, can only react by triggering a review. In order to ensure that review outcomes contribute to enhanced predictability over time, the CMP-3 has requested the Board to improve further the substantiation of its decisions in order to increase understanding of the underlying rationale by users.[16]

In the AWG KP the concern is raised about the DOEs assessing projects on behalf of the regulatory system while at the same being commercially connected to the project developers. The Board in its 2007 report to the CMP has already indicated, this situation might be perceived as potentially compromising. Consequently, a suggestion made within the AWG KP is to transfer the responsibility for selecting and paying the DOEs from project developers to the Board. This, of course, would need some procedural and management decisions.

A more drastic suggestion is to abolish the whole accreditation system and let the secretariat perform the work currently undertaken by the DOEs, provided new, appropriately trained staff and resources are made available and an appropriate fee structure put in place. Such a model would go against the overall trend. Other comparable verification systems typically operate with independent verifiers and through direct arrangements between the verified and the verifier.

Consequently, instead of eliminating the DOEs from the institutional framework, the challenge is for the Board to continue to strengthen its efforts to establish a common understanding of methodologies and requirements and to synchronise quality perceptions. The means are further clarity of system requirements (cf. the above section on methodologies) and a further strengthening of accreditation requirements, supervision and response when standards are not met. Such means are common in comparable systems, and they have been partly put in place already or are presently being discussed by the Board. They comprise:

- The CDM Validation and Verification Manual (VVM) as a standard for DOE's work, which the Bali CMP requested to be made the highest priority.[17] The Board has considered a draft at EB 41 and EB 42 (September 2008) but due to time constraint could not finalize its consideration and will continue its discussion at EB 43 in October.[18]
- Common and operational accreditation and re-accreditation standards, taking into account past performance. A draft document on accreditation standards is made available for public comments September/October 2008 and will be considered by at EB 44 in November.[19]
- Spot checks triggered, e.g. after a complaint by a DOE, an NGO or a stakeholder affected or initiated by the Board itself. A number of spot checks have already been undertaken and have resulted in important corrective actions by the DOEs involved. So far no suspension has been decided.
- Regular surveillance of, e.g., the management and organization of DOEs, and other mechanisms to ensure auditor and technical competences of DOEs. This could be elaboration of standard reactions or sanctions by the Board in cases of equally standardized performance imperfections, with suspension as the ultimate

16 Decision 2/CMP.3 para. 15 (e).

17 Do para.15 (b).

18 EB 42 report, para. 9. http://cdm.unfccc.int/EB/042/eb42rep.pdf

19 Do.para. 10

sanction. At the same time the Board aims at incentivising improved performance by rationalisation of the present system of witnessing, spot checks and surveillance activities[20].

- Regular dialogue between the DOE Forum and the Board, such as the dialogues on the development of the VVM and on accreditation standards.
- Disclosure by DOEs of rejections, i.e. their decisions not to submit projects for registration or not to request issuance.[21]

The result of such intensified efforts should result in validation reports and issuance requests by DOEs that correspond with the views of the Board. This would reduce the number of review cases, increase efficiency and make automatic registration and issuance the rule. At the same time, the issue of the contractual relationship would become less relevant.

6.3. Reforming procedures for final decisions on registration and issuance

A CER as a commodity is fairly unique. Consequently the creation of such a commodity has to be based on innovative thinking. In terms of governance, however, the CDM is comparable with other regulatory systems. But unlike many of these, it is not a traditional command-and-control system and does not contain the traditional separation of functions. It monopolises in one and the same body –the Executive Board – regulatory, executive and quasi-judicial functions. Stakeholders have expressed a concern that this implies a lack of transparency, consistency and predictability, while at the same time it can be perceived as involving possible conflicts of interest. Regardless of the rights of project participants to submit comments to review questions, it is felt that the present system does not sufficiently safeguard the legal position of the project developers, who expect that their voluntary participation should be met with the right to present their case under normal rules of law, i.e. input legitimacy.[22]

As ex-chairman of the Board, I can confirm that the Board deals with review cases extremely thoroughly and carefully. It is also worth noting that recent reports suggest that decision-making by the Executive Board has become stricter over time, referring to increased insurnce that reductions are real, measurable and not least additional.[23] Furthermore, successful implementation of the suggestions offered in the previous sections is expected to reduce significantly the number of review cases, thus increasing efficiency. This does not, however, solve the basic question of a separation of functions. Consequently, consideration could be given to establishing provision for a second opinion on the final decisions on registration or issuance, which at present can only be reversed after resubmission of the entire case. So far, this issue is not among the suggestions being discussed by the AWG KP.

Possible ption could be to set up an Ombudsman system or an arbitration or appeals procedure, as exists in comparable systems.

Normally, an Ombudsman is an official appointed by the government or by parliament (in the CDM context, it would be the CMP), who is charged with representing the interests of the public

20 Do.para. 11 and 13

21 See Dornau, Carbon Finance, April 2008, p. 18.

22 IETA's 2007 report on the status of the CDM, different side events at COP 13/CMP3 on Bali, December 2007, Marcu at IETA side event on the CDM at SBs, 11 June 2008.

23 E.g. Flues, Michaelowa and Michaelowa: UN approval of greenhouse gas emission reduction projects in developing countries, University of Zürich, Center for Comparative and International Studies Working Paper no. 35/2008, . 2008.

by investigating and addressing complaints reported by individual citizens. Introducing an Ombudsman has the disadvantage that his or her findings are typically non-binding recommendations. Consequently, the Executive Board could choose not to follow a recommendation to revisit its decisions. Therefore, it is questionable whether such a model would increase the legitimacy of the CDM governance system. Also, introducing an independent appeals body with specific legal expertise and a formal appeals procedure on top of the present system of review cases would be inefficient, adding an extra layer to the institutional system and definitely increasing transaction costs. In itself this might render participation in the CDM less attractive, in spite of the increase of input legitimacy.

A simpler and more efficient model might be an appeals procedure covering procedural matters only. Such an appeals procedure is embedded in the procedures for accreditation in cases where, on the basis of a spot check, the Accreditation Panel recommends that a DOE be suspended.[24] However, that model would not be satisfactory for project developers who were contesting the substance of the Board's decisions, i.e.it does not add sufficiently to input legitimacy.

Alternatively, an arbitration procedure could be set up with representatives of the EB, the project developers and DOEs, and possibly some independent individuals with a legal background. In such a model, the Board representative would have to assess the justification of his or her own decision in the Board, and the project developers and DOEs would equally tend to defend their original positions. Consequently, this model does not seem to be adequate.

24 Procedure for accrediting operational entities, version 8, annex II (http://cdm.unfccc.int/DOE/cdm_accr_01.pdf).

The challenge is to divide the Board's functions and to refer the final decisions on registration and issuance to a separate and independent appeals body with legal expertise without at the same time reducing efficiency. The only option will be to abolish the present review procedure and let the DOEs' assessments be final, i.e. projects are registered and credits issued upon positive validation or verification by DOEs unless they are appealed against to the new body. This fits in with the expectations of more uniform perceptions of requirements between the Board and DOEs, as well as the expectation that final registration and issuance on the basis of the findings by the DOEs will be the rule (cf. the previous sections). Decisions which still might be contested are dealt with under normal rules of law by the appeals body, whose decisions will be final, substantiated and published.

No institutional changes beyond setting up an appeal body are needed.

For the "new" Executive Board, this means that decisions to undertake reviews and subsequent decisions on the cases will be replaced by decisions whether or not to appeal against a DOE assessment. Otherwise the Board will continue to exercise its regulatory and executive functions. If the Board considers that rulings by the appeals body reveal the need to clarify or revise regulation e.g. on methodologies, it might do so with effect to future cases. Generally the Board will be able to devote more time and effort to these functions to interact on generic issues with the DOEs and with project developers on the basis of their respective positions and functions in the system.

For the project developers, this means that the demand to have a right of appeal against the decisions of the system to an independent body under rules of law will be met. The right of appeal would further be granted to another DOE, the DNA involved and UNFCCC-accredited observers with a particular interest in the case.

Conclusion: the Executive Board as supervisor

As a conclusion, the following elements might, considered as a package, be of inspiration in the further process of improving the governance of the existing project-based CDM:

- Top-down standardization and development of methodology tools and standard setting for accreditation and DOE performance.
- Final registration and issuance upon validation or verification by DOEs unless appealed against.
- Appeals to be dealt with by a new independent appeal body, which will take the final decisions based on legal expertise concerning the conformity of cases with existing Executive Board regulations. The review process to be abolished.
- The "new" Executive Board to continue to exercise its regulatory and executive functions, with the exception of decisions on registration and issuance.
-

The above changes would allow the Board to focus on and strengthen its supervisory role as foreseen by the Kyoto Protocol itself. This would also match existing competence requirements, which in collective terms are insight in the areas of climate change, of policy and of different geographic conditions. No institutional changes beyond setting up an appeal body are needed.
From an efficiency perspective, top down activities will increase costs at Board level while abolishing the review process will decrease costs. At the project-developer level, costs will decrease for their own activities, and new costs will arise only from the appeal system. At the same time, the appeal system will increase input legitimacy, which in itself might increase the acceptance of the mechanism and hence increase activity and. in the end, output legitimacy. Of course, the modalities and procedures for the appeals body have to be more closely considered.
The only remaining issue is that of possible compensation for Board members and alternates corresponding to their work load. But this will automatically come up as soon as appeal body members claim compensation on their part.

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A REFORMED CDM TO INCREASE SUPPLY:

Room for action

Abstract
3,700 CDM projects are in progress in developing countries estimated to reduce emissions by a potential 2.7 billion tons of CO_2 until 2012. However, the success of the CDM has put the system under strain: the estimated supply by 2012 could be as low as 1.8 billion tons of CO_2. To enhance the capacity of the mechanism to increase emissions reduction efforts in developing countries, in particular in the energy and agricultural sectors which will eventually play a large role in abatement, we recommend the development of simplified and objective additionality tests, top-down methodologies and the reform of the validation and verification procedure.

Introduction

While the success of the Clean Development Mechanism (CDM) has been praised by many observers, the mechanism faces today a number of challenges: increasing delays, difficulty in finding auditors to certify projects, and a great number of uncertainties for project developers (Schneider 2007, Sterk 2008, Wara & Victor 2008). These challenges are the price of success: 3,700 CDM projects are in progress in developing nations. These projects could potentially abate emissions by 2.7 GteqCO2 by 2012. The number of CDM projects is growing and is putting the mechanism to the test.

Based on analysis of risks and delays in the CER generation process, we propose certain procedural modifications within the existing institutional and methodological frameworks to enable the CDM to realize the sizeable emission

reductions necessary to combat climate change and to quench the thirst for Certified Emission Reduction (CER) credits stemming from the Annex B countries and the European Union Emission Trading Scheme (EU ETS).

In the first section of the article, we examine the principal characteristics of the projects currently in the CDM pipeline. We then examine in detail the implications of delays and bottlenecks in the process of generating CERs. The pre-2012 supply we evaluate at 1.8 billion CERs compared to the 2.7 billion tons of CO_2 potentially abated by the mechanism by 2012. This assessment hints at various ways to reform and improve the CDM from 2013 onwards: standardized methods of proving additionality; top-down methodologies and a reformed validation and verification process. Ensuring the success of the CDM in the post-2012 world is not only about lowering the cost of compliance for Annex I countries and involving today's non-Annex I countries. It is also about setting a standard for project-based mechanisms that could help build an ambitious international climate regime for tomorrow.

Potential supply of CERs through 2012

A large potential, few countries, few technologies

According to the information available in the UNEP-RISOE CDM/JI Pipeline,[1] over 1,100 projects have already been registered by the United Nations that could yield 1.3 GtCO2 of abatement by 2012.

1 Source: UNEP-RISOE CDM/JI Pipeline, August 2008 (unless specified). The data does not take into account new projects that will enter the pipeline between today and 2012.

Abatement through the CDM is focused on a relatively small number of technologies, often involving non-CO_2 greenhouse gases with potent global warming potentials and potentially low abatement costs. While more than a hundred methodologies have been approved by the CDM Executive Board (CDM EB), 10 methodologies alone are expected to generate 80% of the potential CERs before 2012. Incineration of HFCs and N_2O should yield more than a quarter of all emission reductions in the CDM by 2012; capture and destruction of methane should account for roughly a quarter of the abatement. Nevertheless, more diversified technologies to avoid emissions of CO_2 are also present: renewable energy projects (one methodology covers at least eight sub-types of technologies) should account for one third, and energy efficiency for one tenth, of the emission reductions until 2012.

By mid-2008, 70 countries had submitted at least one CDM project to the UNFCCC Secretariat. By 2012, roughly 80% of the potential CERs generated by projects currently in development should be generated in the Asia-Pacific region, and one fifth in Latin America. Around half of the abatement should take place in China, 15% in India and 7% in Brazil. Five countries alone – China, India, Brazil, South Korea and Mexico – should account for more than 80% of the abatement from CDM projects by 2012, which indicates that a limited number of countries will actually participate actively in the CDM.

According to the World Bank, China was responsible for three fourths of all CDM transactions in 2007. The success of CDM in China is largely due to the country's size and attractiveness, and to the early start it took by developing, among others, several large projects based on incineration of industrial gases. On the opposite end of the spectrum lies Sub-Saharan

Africa, with only 2.7% of the potential credits until 2012. The bulk of the Sub-Saharan projects are hosted by only four countries: Nigeria, South Africa, Ivory Coast, and Kenya.

The two faces of CDM: Large-scale and small-scale projects.2

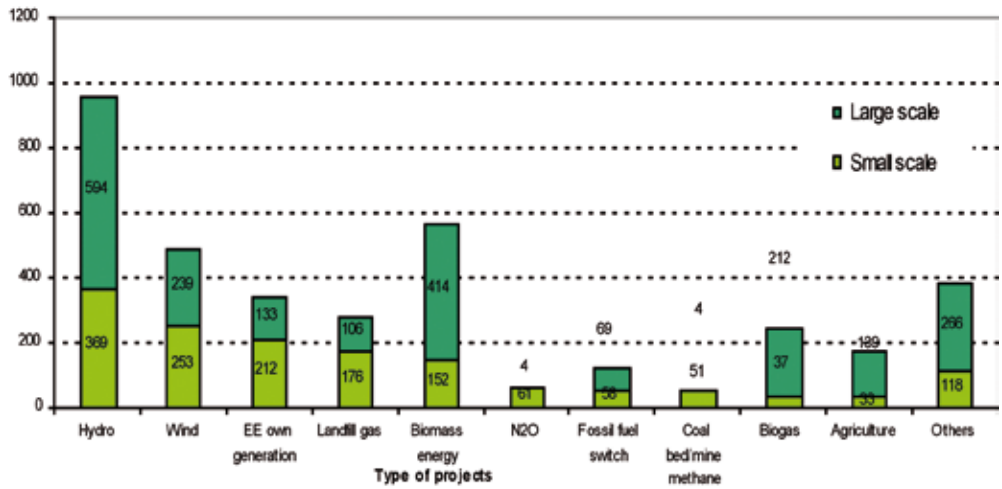
The previous paragraphs might lead the reader to conclude that the typical CDM project is a large-scale non-CO2 industrial gas destruction project in China. This conclusion is partially correct. Because large-scale projects involve low abatement costs and generate significant amounts of CERs, project developers are willing to spend money on the lengthy CDM process, which involves developing a methodology and Project Design Document (PDD), hiring auditors to validate the PDD, paying the registration fee, abating emissions, measuring emission reductions, and again hiring auditors to verify the emission reductions. As a result, large-scale projects have historically been among the first projects to emerge.

However, more than 1,600 small-scale projects – which generate less than 60 000 CERs per year – are also being developed (see Figure 1). These types of projects represent 45% of all projects under development and could yield 245 million CERs by 2012. Small-scale projects enjoy some flexibility in the registration process that reduce transaction costs: a simplified PDD development process, simplified modalities for monitoring emission reductions, a reduced registration fee, and bundling of similar projects to reduce the share of fixed costs.

Fenhann (2008) points out two elements - among others - that could explain the popularity of small-scale projects. First, while large-scale methodologies must be proposed by project developers and approved by the CDM EB in a

2 This section is partially based on Joergen Fenhann's (UNEP Risoe) article: Carbon Finance, 19 May 2008: « Why are there so many small-scale projects? »

Figure 1 – Breakdown of large- and small-scale projects by type



Source: UNEP RISOE CDM/JI Pipeline Analysis and Database, 1 August, 2008.

bottom-up process, small-scale methodologies are approved in a top-down process. This triggered the emergence of small-scale projects in

The number of CDM projects is growing and is putting the mechanism to the test.

sectors for which small-scale methodologies - but no large-scale methodologies - had been approved. This was in particular the case for the 594 hydroelectric projects and 414 biomass projects, which together could yield 161 million CERs by 2012.

A second factor seems more decisive: the characteristics of the projects, and the political and technical environment in the host country. HFC, N_2O and landfill gas projects are by nature large-scale. Some projects are also by nature small-scale, in particular in the renewable energy sector: wind, solar, hydro and biomass. In this context, the political and technical environment in the host country seems to play a major role. Of the 158 small-scale wind projects being developed in the world, 138 are hosted by India; 309 of the 504 small-scale hydro projects are hosted by China; and of the 328 small-scale biomass projects, 201 are Indian, 42 Brazilian and 23 Malaysian. Malaysia has also developed around 30 projects for composting oil palm residues. These elements seem to indicate that political will – and a favourable regulatory, technical and economic environment – can lead to the emergence of clusters of small-scale projects that can be at least partly financed through the CDM.

A closer look at the supply

An assessment of the real supply by 2012

Having a project registered and credits generated is risky

The principle behind the CDM is in theory extremely simple: any project that can be implemented thanks to the emerging carbon price and which generates an effective reduction of GHG emission of one ton of CO_2 may claim a CER. However, in practice it is unfortunately not that simple.

For the UNFCCC, the life of a CDM project begins the day the Project Design Document (PDD) is submitted to the public for comment. The PDD must then be approved by the host country, validated by a Designated Operational Entity (DOE) and registered by the CDM Executive Board (CDM EB). Once the project has been registered, it is eligible to generate CERs. Abated emissions must be monitored and verified by a DOE throughout the lifetime of the project. Once the emission reductions are verified, the CDM EB issues the corresponding CERs.

The discussion in previous sections assumed that all emission reductions set forth in PDDs will actually generate CERs. Unfortunately, this is not the case. Delays and bottlenecks in the process will trim the potential amount of CERs that will be available before 2012.

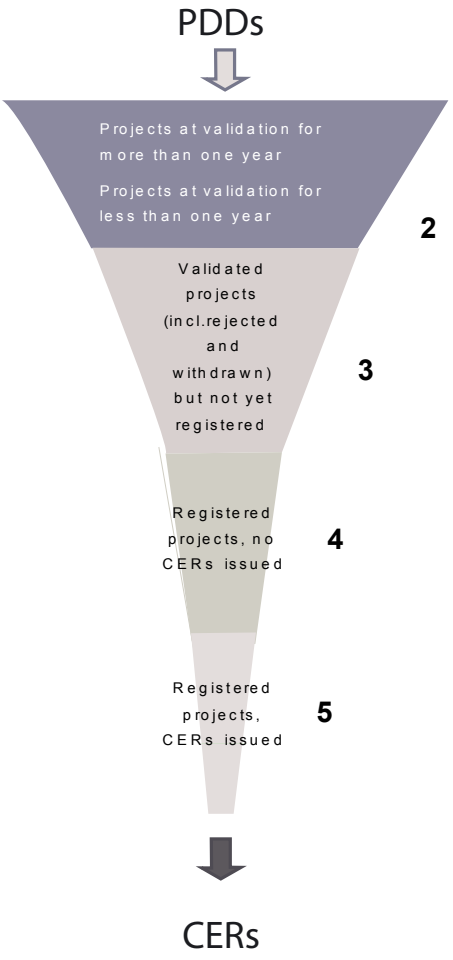
From the public UNFCCC data, we could not find any evidence of a PDD submitted for validation that was not approved by a host country. Along the registration process, it can thus be reasonably assumed that a host country will systematically approve all projects that have their PDD submitted to the UNFCCC: first, it is in the country's interest to approve a project, as long as it complies with the national sustainable

development strategy; second, since drafting a PDD is costly, it is likely that project developers engage in discussions with the host country's designated national authority while drafting the PDD. However, there were delays in approving projects varying from one week (Qatar) to 17 months (Uruguay).

All PDDs approved by the host country are not necessarily validated by the DOEs and approved by the CDM EB. Several projects have been rejected during this process. Even if a project is approved by the CDM EB, the potential to generate CERs mentioned in the PDD might not be achieved for technical reasons: for example, if the implementation of the project is delayed or if its operation is suboptimal. On the other hand, a project might generate more CERs than originally envisaged in the PDD.

All these risks make the CER generation process resemble a funnel. See Figure 2. A great number of PDDs go into the funnel, but a much smaller number actually generate CERs as an end product. Delays due to bottlenecks, present in each step of the registration and issuance processes, lengthen the funnel and reduce the supply of CERs that will be available before 2012.

Figure 2 – From reducing emissions to generating CERs: associated risks and delays



Source : Mission Climat of the Caisse des Dépôts, 2008.

Methodology used to assess the supply[3]

To account for the risks faced by CDM projects and to estimate the real number of CERs that will be available, we evaluated the potential amount of CERs generated by a given project based on the data available in the PDD and in the UNEP/RISOE CDM Pipeline for each month in the period from January 1st, 2000 to April 30th, 2013[4] and applied four corrective factors:

- A "pre-validation factor" which measures the probability for a project to be validated within a year. Historically, 85% of all validated projects were validated within a year, and projects that remained at the validation stage for over a year were unlikely to be ever validated.
- A "validation factor" which measures the probability for a project that began the

3 For a full explanation of the methodology, see Elabed & Leguet (forthcoming).

4 The date of April 30th, 2013 was chosen as it corresponds to the end of the second commitment period of the EU ETS, today's main source of demand for CERs.

validation process less than a year before to be validated by the DOE.

- A "registration factor" which measures the probability for a project that has been validated by a DOE to be registered by the CDM EB.
- A "generation factor" which measures the probability for a project using the registered by the CDM EB to generate the amount of CERs mentioned in the PDD.

Three delays are also applied to the estimate, based on observed historical delays:

- The delay from the day the PDD is submitted for comments and the request for registration;
- The delay from registration request to registration;
- The delay between the date of the marginal emission reduction that generated a CER and the issuance of the corresponding CER.

Additionally, an estimate of the new projects entering the pipeline until 2012 is carried out by observing historical trends by country and by sector.

The long and winding road to CERs

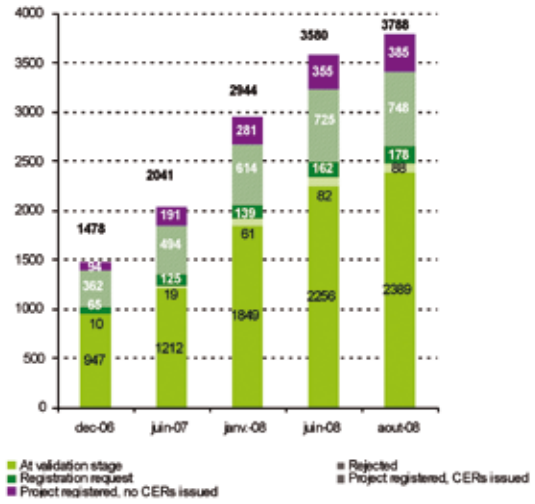
Bottlenecks increase delays

Some bottlenecks are apparent in the process. The first observed bottleneck is the delay in project approval by the host country. This delay seems to be increasing for several countries, in particular for China, as the number of projects applying for approval increases. The second bottleneck is the validation of the project by DOEs: the validation process takes anywhere between 58 and 520 days, depending on the country, with eight months on average. This may be explained by the fact that DOEs are understaffed. They are losing auditors to project developers and CDM boutiques and it takes time to train qualified auditors. The third bottleneck is the CDM EB: the CDM EB issued CERs for the first time in October 2005. In 34 months, only 7% of the potential CERs up to 2012 have been issued. With less than five years to go, a potential 2.5 billion CERs have yet to be issued and it is uncertain whether the CDM EB can cope with the associated extra workload. This may indeed prove not to be the case, as new projects keep entering the pipeline every month, at an average rate of 120 new projects per month. In 18 months, the number of projects at the validation stage has multiplied by 2.5, and reached 2,255 projects in June 2008. During the same period, only 700 projects were registered (see Figure 3).

Not every ton will become a cer…

Throughout the process of turning the potential abatement of one ton of CO_2 into a CER, the first hurdle is the "pre-validation factor," which estimates the time necessary for the host country to approve the project. Upon applying this factor, we find that 25% of the Chinese projects (400 projects) and 20% of the Indian projects (roughly 300 projects) currently in the pipeline might never yield CERs. The second hurdle to overcome is the "validation factor". Only two-thirds of the projects in development could be validated. The third hurdle is the "registration factor". This factor measures the probability for a validated project to be directly registered, and seems to depend greatly on the sector or the methodology used. In particular, validated energy efficiency projects – about which the EB has expressed concern regarding additionality – account for more than half of the projects that are either rejected or reviewed by the CDM EB. The last hurdle to overcome is the actual generation of CERs. An emissions abatement project may under- or over-perform as compared to the provisions outlined in the PDD. While the

Figure 3 – Evolution of the CDM Pipeline (count: number of projects)



Source: UNEP/RISOE CDM Pipeline, 1 August, 2008.

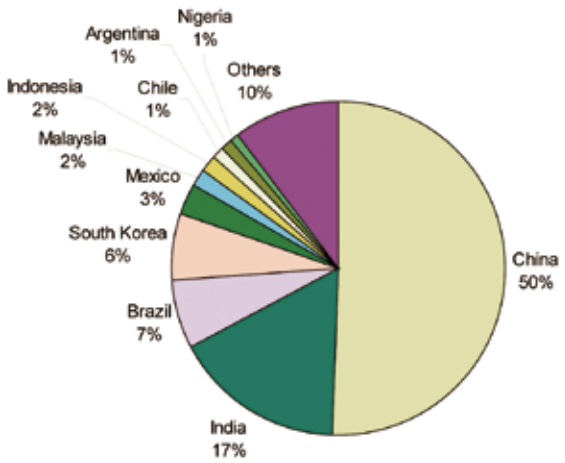
average registered CDM project yields 94% of the emission reductions it intends to produce, this average hides differences among sectors. Industrial gas incineration projects achieve over 100% of their intended abatement and energy-related projects achieve between 60-80%, where as cement, steel, agriculture and transportation projects deliver only roughly 50% of the emission reductions planned in the PDD.

Our assessment: 1.8 billion CERs

Data extracted from the UNEP/RISOE CDM Pipeline indicates a potential supply of 2.7 billion CERs by 2012. However, our estimate, taking into account the abovementioned bottlenecks and factors, is that only 1.8 billion CERs will effectively be generated by April 2013, this being the end of the second compliance period of the EU ETS, the primary source of demand for CDM credits. This estimate does not fundamentally modify the balance of credits generated by country: China should still be the largest supplier of CERs, providing 50% of all CERs by April 2003; 75% of all CERs will be generated by only three countries (China, India, and Brazil), and 90% by only ten countries (see Figure 4)..

Around 1 billion CERs could be generated by only three methodologies: AM1 (incineration of HFC), ACM2 (grid-connected electricity generation from renewable sources) and AM21 (incineration of N_2O); and 75% of the expected supply would come from only eleven methodologies. Energy projects such as renewable energies, fuel switch and energy efficiency on the production side should generate 45% of all CERs by 2012. On the whole, energy efficiency projects, either demand- or production-side, should represent 12% of all CERs. Incineration of HFCs, N_2O and

Figure 4 – Breakdown of estimated supply of CDM projects by country (Total: 1.8 billion CERs)



Source: Mission Climat of the Caisse des Dépôts, based on UNEP/RISOE Pipeline data, 1 August, 2008

PFCs should yield roughly 40% of the CERs, while fugitive methane projects such as pipelines, coal mine methane and landfill gas should account for 10%.

Recommendations for the CDM

Our analysis suggests that while the current CDM should result in significant emissions reductions of 1,8 Gt through April 2013, it will not realize its full potential of generating 2,7 Gt of reductions. The difficulties faced by the current mechanism should only marginally impact the development of non-CO_2 industrial gas reduction projects. On the other hand, they place at great risk the growth in projects in other sectors, among others energy production and agriculture. Projects in these other sectors will eventually make up the bulk of CDM projects, as the potential for HFC and N_2O projects is dying out. If we seek to make the CDM an instrument that can help achieve significant emissions reductions in developing countries and serve as a key building block for the post-2012 international climate regime, we must improve its ability to perform.

Three main recommendations emerge from our observation of the bottlenecks, risks and delays observed during the CDM project approval and verification process that may be used to strengthen and enlarge the mechanism: (1) use simplified and objective additionality tests; (2) develop methodologies in a top-down process; and (3) improve the validation and verification process.

A. Use simplified and objective additionality tests

Doubts have been raised by some observers as to the questionable additionality of some projects and the need to tighten criteria for proving additionality (see for example Michaelowa and Purohit, 2007; Schneider, 2007; Wara and Victor, 2008). These studies have focused on possible "false positive" projects i.e. possibly non-additional projects that do get registered. Surprisingly little material can be found on "false negative" projects i.e. possibly additional projects that do not get registered. This may be because these false negative projects are by definition never developed. There is unfortunately an inherent information asymmetry between the project developer and the DOEs, and efforts to tighten the criteria for proving additionality might actually have adverse effects, as they would increase costs, delays and risks, and possibly increase the number of false negatives.

On the contrary, additionality tests should be simplified and based on objective criteria, such as a positive list of technologies or technology standards, technology penetration rate and sectoral benchmarks, rather than on the existing tools. This would make it easier for the DOEs to validate projects, and easier for the CDM EB to assess the work of the DOEs. On the negative side, such lists, rates and benchmarks would require a significant amount of time to agree upon and could turn out to be very data-intensive. But in the longer term, the costs of the system would certainly decrease. At the same time, the number of false positives would, also, most likely increase. It should be borne in mind that two similar approaches can be used to decrease the amount of potentially non-additional CERs that enter the market. First, some approaches for discounting CERs generated by projects whose additionality is

not certain have been proposed (see for example Lambert, 2007). Second, potential windfall profits can be taxed away, and the proceeds used to fund climate-friendly projects such as projects that reduce emissions or climate change-related research. This is what the Chinese government appears to be doing with the sustainability tax it set up, whose proceeds feed the Chinese CDM Fund.

Simplified and objective additionality tests would gradually shift the debate from a project-by-project assessment to the assessment of programs or even policies. The real long-term benefit of a reformed CDM should in essence be to provide incentives for low-carbon investment by favouring the development of national policies and regulations. As we mentioned previously, the success of small-scale projects despite supposedly higher relative transaction costs indicates that political will, associated with a favourable regulatory, technical and economic environment, can lead to the emergence of clusters of emission-reducing projects. This is a good omen for programmatic CDM and could also provide a testing ground for policy-based CDM pilot projects based, for example, on biomass in India or small hydropower in China.

B. Develop methodologies through a top-down process

Another reform that might be considered – and is hinted at by the success of small-scale projects – is developing methodologies using a top-down rather than a bottom-up framework. These types of methodologies, developed for a limited number of sectors, should include additionality tests based on objective criteria including, as previously mentioned, technology or technology standard, technology penetration rate and sectoral benchmarks (see for example Sterk, 2008). Top-down methodologies could prove especially efficient for technologies that have a low penetration rate, such as CCS or energy efficiency projects. The challenge would obviously lie in agreeing on thresholds for the technology penetration rates, sectoral benchmarks, etc.

C. Improve the validation and verification process

In the current CDM, the CDM EB is second-guessing the validation work carried out by the DOEs with the help of the experts of the Registration and Issuance Team. This process takes time and may partially explain the bottleneck observed in the registration process. Furthermore, review requests and rejections of validations based on the assessment of experts could undermine the process in the long run, since DOEs could then become very selective in the projects they choose to validate. This could in turn deter project developers in some sectors for which the proof of additionality or other elements in the PDD are too subjective, in particular energy efficiency projects. The registration process pursued by the CDM EB should rather focus on ensuring that an adequate validation protocol has been followed. In this respect, the Validation and Verification Manual (VVM) currently being developed by the Board is a good starting point. Additionally, the experts of the Registration and

Simplified and objective additionality tests would gradually shift the debate from a project-by-project assessment to the assessment of programs or even policies

Issuance team could perform their review before that of the DOEs, since they have the sectoral and technical expertise that DOEs lack in certain cases. Hence, they can provide technical input to the DOEs for use in the validation process, rather than following the work of the DOEs and possibly contradicting their validation work. If this option is pursued, it would be necessary to pay the experts either by the DOEs or by an *ad hoc* fund.

Our three recommendations are to develop simplified and objective additionality tests, top-down methodologies and to reform the validation and verification procedure.

In a very similar way, the verification process could be improved. The CDM EB may focus on checking that an adequate verification protocol has been followed. The goal of verification should not be to check the occurrence of every emission reduction claimed but rather to make sure that the risk of overestimating emission reductions is properly managed. Two initiatives of the CDM EB are promising in this respect and should be pursued: the previously mentioned Validation and Verification Manual and programmatic CDM, for which random sampling of the individual CDM Programme Activities is allowed for verification (UNFCCC, 2007). The voluntary market could also be a source of inspiration: the Voluntary Gold Standard has set up a system whereby a share of proceeds from every project goes to a fund managed by the Standard. The purpose of the fund is to pay the verifiers to randomly verify projects. Setting up a similar system for the CDM would, apart from reducing overall verification costs, address the concerns of some stakeholders that DOEs have a strong incentive to validate any project because they are paid by the project developer and not by an independent body managed by the UN. It would also help address the looming bottleneck at the verification stage due to the lack of trained auditors.

In a nutshell, the CDM EB should rely more on the DOEs, which are supposed to work for and not against the EB. Governments have long understood that verifying income tax declarations is costly, hence they have taken a risk-based approach to spot tax evasion by using random sampling in the verification process. If CO_2 is to become the 21st century's currency, the same approach could be used to the benefit of the atmosphere.

Outlooks

In eight years, the CDM has achieved a considerable task. First, in environmental terms, it should reduce emissions until 2012 by roughly 1.8 billion tons of CO_2. More importantly, it has become today's standard for project-based mechanisms, which even critics of the mechanism admit (see for example Wara and Victor, 2008). However, the success of the CDM has put the system under strain. Multiple bottlenecks have appeared and must be remedied in order to enhance the CDM's capacity to increase emissions reduction efforts in developing countries. Our three recommendations are to develop simplified and objective additionality tests, top-down methodologies and to reform the validation and verification procedure. These recommendations seek to expand the scale of the CDM among others in the energy and agricultural sectors. Eventually these sectors will play a much larger abatement role than the "low hanging fruits" of non-CO_2 industrial gas abatement, which contributed to the early development of the CDM.

The road to Copenhagen and beyond is clear: the CDM crediting process should be streamlined and the mechanism should be enlarged. Expectations are high: some of the legislative proposals discussed in the US Congress include provisions for using international offsets. Equally, the European Commission's proposal for the post-2012 EU ETS – which is today by far the main source of demand for CERs - includes a provision for crediting projects that reduce emissions outside of the scheme. Such a provision could either supplement the CDM or replace it in case it fails to deliver. If the CDM succeeds in remaining the prevailing standard, it could help link the EU ETS with emerging carbon trading schemes in other nations, including a future American effort. Food for thought and room for action!

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References

Elabed G & Leguet B (forthcoming), "The Clean Development Mechanism: How many carbon credits by 2012?", Climate report, Mission climat – Caisse des Dépôts.

Fenhann J (2008), "Why are there so many small-scale projects?", Carbon Finance, 19 May 2008.

Michaelowa A & Purohit P (2007), "Additionality Determination of Indian CDM Projects: Can Indian CDM Project Developers Outwit the CDM Executive Board".

Schneider L (2007), "Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement", Öko-Institut, report for the WWF.

Sterk W. (2008), "From Clean Development Mechanism to Sectoral Crediting Approaches – Way forward or Wrong Turn?" JIKO Policy Paper.

UNFCCC (2007), "Guidance on the registration of project activities under a programme of activities as a single CDM project activity", Annex 38 to the minutes of the 32nd meeting of the CDM EB.

Wara M. & Victor D. (2008), "A Realistic Policy on International Carbon Offsets", PESD Working paper #74.

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CDM

Developing Country Financing for Developed Country Commitments?

How to deal with the challenges of the prevailing unilateral financing of CDM projects and the lack of technology transfers?

Abstract:

The CDM has so far almost exclusively thrived on local non-Annex-I financing and technology. To alter this situation, changes in the modalities for CDM are needed. Such changes must address those corporate interests that see emission reductions as an opportunity. These are not the emission constrained entities located in Annex-I countries. To improve the ability of CDM to respond to its original purpose three options are proposed: Deregulate CDM to promote (foreign) investor confidence in the mechanism; introduce foreign (Annex-I) technology requirements in the CDM projects; and/or establish a sector-based government-to-government model that includes technology development, transfer, and deployment agreements.

Despite initial assurances to the contrary,[1] it is generally overlooked that CDM rests almost entirely on investors in developing countries being willing to put up the finance for projects, that through the generation of Certified Emission Reductions (CERs), help developed country emitters avoid having to make such investments. Instead, developed country emitters are being offered non-investment-based 'commodity credits' (i.e. CERs) from projects that, from an investment perspective, are in many cases comparable to similar projects in an Annex-I context. For example,

1 It is actually not possible to find specific references in the Protocol or the Accords regarding exactly who is supposed to fund which kind of project. The only evidence is records of positions prior to the actual establishment of the CDM in Kyoto, as well as interesting exchanges of questions and answers between the EU, the Umbrella Group and the EU Commission (see FCCC/CP/1998/MISC.7 at http://unfccc.int/resource/docs/cop4/misc07.htm) after COP3 clearly spelled out that the focus for CDM was to increase FDI for emissions-reduction projects (see also Lütken & Michaelowa (2008) pp. 9ff.).

erecting a wind farm in China is not significantly cheaper than doing so in Spain. This was neither the intention nor the expectation regarding the CDM. Rather, the CDM was supposed to generate additional investment flows from Annex-I countries with high abatement costs to non-Annex-I countries with inefficient power supplies, industrial production and other deficiencies, thus creating the potential for exploiting lower marginal abatement costs.

Compared to the still absent foreign investor, the motivation for local investors to adopt non-domestic technologies on normal commercial terms is limited…..Therefore, unsurprisingly, the CDM also has a hard time promoting any technology transfer.

The effect of this is that the financial flows from Annex-I to non-Annex-I countries that were expected on the basis of calculating the so-called 'marginal abatement costs' are considerably lower than originally anticipated. Compared to the still absent foreign investor, the motivation for local investors to adopt non-domestic technologies on normal commercial terms is limited, being expensive, unfamiliar or even unknown. Therefore, unsurprisingly, the CDM also has a hard time promoting any technology transfer.

When we look at improving the reach, quality and sustainability of the CDM in a post-2012 setting, we should first of all ask ourselves if we are happy with the situation as it stands. If not, what would be the most appropriate corrective action? This article assumes that, presented with the above facts, none of the parties at the negotiating table should be happy with the present situation. Therefore, the article presents options for potentially significant changes to the regulations governing the CDM. As step one, it demonstrates that distinguishing between threat and opportunity as investment drivers has a high degree of explanatory effect for the actual records of the market, i.e. that financial unilateralism must be expected in a market-based structure like CDM because it is designed to promote the pursuit of opportunity, whereas emission constraints are treated as a threat by the targeted Annex-I corporations.

The article discusses briefly the implications of unilateral investment mainly for additionality determination before moving to a presentation of three options for countering the situation: one includes the option of abolishing the additionality test altogether; the second formalizes technology transfer as a requirement for CDM registration; and the third introduces technology agreements as a basis for sectoral approaches.

To avoid misunderstandings of the message in this article, please note that use of the term 'unilateral financing' should not be confused with the normal understanding of unilateral projects, which only refer to the existence of an emissions reduction purchase agreement at the time of registration with the Executive Board. Unilateral financing refers to the financing of the underlying asset, which only rarely stems from Annex-I parties.

Background

There are no specific statistics on the involvement of bilateral investment in CDM projects, and there is no requirement for project hosts to indicate the specific financing model for the project in the PDDs. However, most PDDs reveal what kind of involvement there is by Annex-I

parties. A survey of the first 628 registered CDM projects indicates that projects are generally unilaterally financed. It also provides evidence of the kind of Annex-I country companies that do invest in CDM projects, and of the geographical distribution of bilateral investment activities, however small they may be.

Of the 628 projects, 48 more or less explicitly seem to involve foreign investment capital (there is uncertainty attached to the figures because the investment models are not disclosed). The 48 projects are distributed among 29 different investors. Among those that have invested more than once are Agritech, Union Fenosa, Ecosecurities, Lafarge, World Wide Recycling,

Table 1. Capital flows for private infrastructure in developing countries, million US$

Investment Year	Latin America	South East Asia	South Asia	Middle East & North Africa	Sub-Sahara Africa	Total Investment
1990	440	44	0	0	40	524
1991	0	379	614	n.a.	0	993
1992	5,140	4,128	20	0	0	9,288
1993	2,857	5,578	1,051	2,927	0	12,413
1994	4,076	6,823	2,075	205	76	13,255
1995	6,457	8,371	2,809	0	77	17,714
1996	9,639	11,063	4,079	0	428	25,209
1997	22,912	13,435	1,469	4,608	754	43,178
1998	18,916	5,190	1,291	1,620	715	27,732
1999	10,611	5,176	2,593	858	585	19,823
2000	14,382	3,502	2,414	150	451	20,899
2001	6,239	4,178	960	2,182	713	14,272
2002	7,423	3,461	396	30	484	11,794
2003	7,171	9,735	843	360	1,297	19,406
2004	3,325	3,769	4,235	1,199	56	12,584
2005	4,562	6,294	1,384	400	1,359	13,999
2006	7,144	2,626	2,953	2,336	616	15,675
Grand Total	**131,294**	**93,753**	**29,185**	**16,875**	**7,649**	**278,756**

Source: Public-Private Infrastructure Advisory Facility (PPIAF), World Bank. The Private Participation in Infrastructure Database (Accessed November 2007).

Gamesa, Econergy, Panasonic and Mitsubishi. Japanese investors seem to focus on Asia, while the rest have a significant majority of activities in Latin America: there are 19 projects in Asia, 4 in Africa and 25 in Latin America. Most projects seem to be joint ventures, for which the capital distribution between the local company and the foreign investor remains undisclosed.

The 48 projects correspond to 7–8% of the total portfolio or the normal approximately 10% share of FDI in the Gross Fixed Capital Formation (GFCF) of developing countries. Thus, there is no evidence that FDI has increased for projects related to CDM compared to normal investment flows. Another important observation is that most investors are technology providers in pursuit of opportunity. Those who are not are industrial corporations with existing operations in the host non-Annex-I country, i.e. they align the CDM opportunity with their existing business strategies.

There is obviously no trace of any significant foreign investment effect of CDM – at least not so far

The evidence from this analysis is that more than 90% of CDM projects are unilaterally financed, and only an insignificant share truly reflects the initial idea of Annex-I entities moving their investments to areas where the marginal cost of emissions reduction is lower than in their domestic markets. Further evidence of this is provided by looking at general investment flows for infrastructure investments in developing countries. The PPIAF (Private Participation in Infrastructure Advisory Facility) of the World Bank provides statistics for private participation in infrastructure in developing countries. This advisory facility was set up in response to the remarkable growth in FDI for infrastructure projects in developing countries during the 1990s, but the trend suffered a serious setback in 1998 due to the Asian financial crisis. Projects had started to emerge from practically zero in 1990 as investment climates improved and financing techniques, including risk mitigation products, evolved to provide acceptable rates of return on the investments. The bubble burst, however, with the financial crisis, which revealed the fragility of the market and the incompleteness of regulatory mechanisms, procedures and traditions.

This happened before Kyoto and – ironically – came to a halt just as the Kyoto Protocol came into being. According to the PPIAF programme,[2] private investment flows for energy projects (the most obvious area for emissions-reduction projects) in developing countries fell from approximately US$43 billion in 1997 to US$28 billion in 1998. But the decline for the energy sector has continued ever since, while other infrastructure sectors (telecoms, water, and transport) have experienced more diverse fluctuations. The investment level for energy projects fell to US$19 billion in 2003 and decreased further to US$15 billion in 2006 or about a third of the level in 1997. Further, Latin America is dominant in the statistics representing half or more of the investments, while investments in East and South Asia together dropped to only US$5 billion in 2006, from US$15 billion in 1997.

2 http://ppi.worldbank.org/explore/ppi_exploreRegion.aspx?regionID.1.

Investment motivation

There is obviously no trace of any significant foreign investment effect of CDM – at least not so far. So why, despite the obvious lack of investment appetite for CDM on the part of emission constrained Annex-I entities, is CDM thriving more than ever?

It all has to do with investment motivation.[3] Corporate decisions related to emissions constraints take the form of a response to a threat (as opposed to the pursuit of an opportunity). this may be compared with taxation: allocation of fewer allowances than needed to emitting industries constitutes a kind of tax.

Addressing such corporate threats requires managerial decision-making. Here, differentiation may be made between:

- Informed decisions
- Uninformed decisions
- Informed non-decisions
- Uninformed non-decisions.

The non-decisions are rarely efficient responses to threats, but they do apply to the (lack of) pursuit of opportunities, typically taking the form of neglect. This should not be confused with addressing a potential threat through inaction. If a threat can be addressed through inaction, then inaction will be the actively decided strategy.

Non-decisions are less fatal when linked to considering opportunities rather than addressing a threat. If a single corporation is observed in isolation, threats affect its existing core activities, whether it acts or not. Opportunities, on the other hand, only affect the strategic position of the corporation if they are exploited. Therefore, threats need to be addressed more urgently than opportunities need exploiting.

Investments in new markets, compared to existing ones, normally take the form of longer-term strategic investments due to the additional costs involved and the relative detachment from the national market. This is particularly true for obvious CDM potentials in large-scale investments in energy infrastructure with long construction periods, long life-times and long payback horizons. It is not likely that such investments will be intended originally as stand-alone activities: they are rather part of a long-term strategy building on an analysis of long-term expectations in a given market. To exemplify with an essential quotation from a European power corporation: 'If we had a power plant in India, we might consider a wind turbine there. But never a landfill. And not without the power plant'. This quotation poses two serious challenges to the expected willingness to pursue low-cost emissions-reduction opportunities in non-Annex-I countries: 1) the response to the emissions constraint will be linked to markets already addressed by the constrained entity and 2) the possible investment will be restricted to technologies with which the investor is familiar. This constitutes significant limitations on the scope of possible CDM investment for the emission constrained entities. The message here is that, unless CDM investments can be linked to strategies that have already been developed for entering new markets, CDM in itself will not drive the investment. If, however, they can be aligned with already developed strategies, they will be taken on board as an additional consideration.

But let us look at how such investment decisions are made.

3 The following is a brief description of decision processes, taken from work done by Butler et al. (1993) and further analysed in Lütken and Michaelowa (2008).

Responses to threats

Decisions made in response to a threat are different in character when compared to decisions relating to opportunities. Decisions concerning threats are made under a certain strain, which is not necessarily the case for the exploration of possibilities – although, of course, there are windows of opportunity. Threats are problems that need solving; potential investments are options that may be exploited. An employee presenting an investment proposal will be evaluated differently depending on whether the proposal solves a problem or opens up an opportunity.

The presentation of an investment option is typically 'emergent':[4] there may or may not be a deadline, but it is only presented if and when employees believe it to be sufficiently attractive for them to gamble on their status in the corporation. It is a bottom-up process. Moreover, because an option is not (necessarily) critical to the corporation, it may – depending on the corporate culture – be more or less acceptable to think 'out of the box', i.e. not necessarily complying completely with core business strategies.

If, on the other hand, there is a threat that needs addressing, there is often a deadline. Management most often reacts to an event or development that is external to the corporation. The typical demand will be a cost-efficient solution, but also a solution that is easily implemented. Employees typically deliver their proposal responding to requests from management. Hence, the process is top-down and 'deliberate'. A solution that is proposed but dismissed does not make the problem go away: there has to be asolution. An alternative must be sought, which increases the strain on both the corporation and the employees. The stakes are higher, the margin for error narrower.

This renders strategic investment decisions in response to threats implausible in two dimensions:

1. The employee does not present an option with a potential profit or return on investment. Instead he presents an already anticipated solution. The employee will be evaluated only on the quality of the proposal. This particularly includes ease of implementation. Presenting a proposal that is conceptually distant from core business is risky: partly because there is relatively more focus on the proposed solution; partly because the ease of implementation of a non-core business proposal is relatively lower; partly because it involves a status evaluation of the employee (and his lack of ability to present implementable solutions); and finally because a rejected proposal sends the employee back to the drawing board.
2. Investment decisions are more often emergent and less often deliberate. Concluding in light of the above, this suggests that strategic investments as a response to threats are generally less likely compared to strategic investments in pursuit of opportunities.

This establishes two filters in assessing the likelihood of CDM investments in emission constrained corporations:

Filter 1: The emission restriction is treated as a threat, which leads to a top-down decision-making process. Investment options are not sought in the first place, and while the employees do not necessarily understand any specific

4 In an empirical study conducted in the UK in 1988 by Marsh et al., it was shown that 'explicit strategic planning, even at a divisional level, [seems] to have only limited impact on the generation and approval of investment projects; it was more emergent than deliberate' (Butler et al. (1993), p. 54). There seems to be no urgency involved. The corporation can afford non-decisions.

limitations on the range of optional solutions, they are likely to define a set of delimiting criteria based on their understanding of management priorities. Employees are unlikely to come up with investment proposals at all if other options exist.

Filter 2: If an investment materializes as evident in order to address the threat, the employees will at first be aware that this is unlikely to be endorsed by management. Still having to solve the problem, however, their risk averseness will lead them to propose solutions that can be implemented as easily as possible. This means that they will stay away from more controversial proposals and keep options within the existing strategic or even tactical reach of the corporation with a high probability of endorsement by management.

In most cases, the CDM fails on both filters. Investments, whether CDM or not, are out of scope in the first place because making an investment in itself is a poor solution to a threat. And because CDM encompasses several sectors and fundamentally covers only countries that do not form core business markets for most emissions-constrained entities, the core business criterion that the employees will most probably pursue to ensure ease of implementation is only rarely fulfilled. Furthermore, employees will have particular difficulties in presenting their case in the unlikely event that they should decide to pursue the non-core CDM investment option. They can hardly justify investing time and money in the collection of information. At the same time, a strong and well-documented case is what they need to convince management. If they are not specifically asked to look into the CDM investment option, they are unlikely even to consider it. This means that CDM investment is in conflict with the normal ways in which investment proposals emerge in corporations.

Pursuit of opportunities

It follows from the above that CDM investments have to result from the pursuit of opportunity, and apparently by corporations that do not regard the emissions constraint as a threat. An illustrative case of a pursuit of opportunity created by imposing regulation would be the development of the Danish wind-turbine industry during the 1980s. With politically formulated targets for the adoption of renewable energy sources in the Danish energy supply system, a market for renewable energy technology was born. Seriously affecting the profitability of the energy supply (wind energy at the time being appreciably uncompetitive even at increased oil prices) the power sector could have been expected to pursue the opportunity to start developing and constructing wind turbines. It did commission two turbines and initiated research and development activities primarily related to operation, integration and control. These, however, seem to have been activities initiated solely as responses to the threat constituted by the obligation to include larger shares of wind-based power supply. The special competence developed by the Danish utilities for integrating high percentages of wind-generated electricity into electricity grids has not been exported at all to the growing number of countries that are presently embarking on significant expansions of wind energy.

…the issue is how to address this unilateral investment drive and bring CDM back to its original idea of promoting investment and technology transfer.

The business opportunity inherent in erecting wind turbines – namely the production and supply

of wind turbine technology – was exploited by others, not the power corporations. Instead, Vestas, which has a history of producing, among other things, coolers and cranes (an obvious foundation), started production in 1979. Since then it has developed into the largest global manufacturer of wind turbines, initially supported by conducive local market conditions, and gradually expanding into other markets where equally favourable market conditions had evolved.

This example indicates that it is not the product but the process that defines the core competencies of a corporation. The power corporations did not solve the problem because their own processes do not support the development of new products, only the optimization of their own processes. This also indicates that opportunities that are explored as a response to a threat encompass only those options that mitigate the direct effect of the threat. Broader market opportunities are explored by others.

For CDM, the opportunity rests first and foremost with the local, unilateral project developers. They do not fail on the filters because there is no threat demanding any particular response. They can afford to wait or to do nothing at all. The important question, of course, is why they choose to invest. As the analysis of the first few hundred CDM projects illustrates, developing countries' own project developers and power corporations support virtually all CDM projects with their own capital. At first sight they should be even more remotely interested in emissions reduction compared to their Annex-I counterparts. But it turns out that their investment appetite in wind energy, biomass projects, hydro projects and energy efficiency beats their emissions-constrained colleagues in Annex-I countries. They are obviously not responding to any threat because there isn't any. They are pursuing opportunity.

On the face of it, there should be nothing wrong with that. But for those projects that rely on two revenue streams, power and carbon, what is questionable is whether these massive unilateral investments are driven by CDM and the relatively limited revenues from CERs, or whether their pursuit of opportunity rests solely with the CDM registration of projects they were planning in any case. There are obvious alternative reasons, most of which relate to domestic policies: for example, the Chinese targets for wind- and biomass-based power generation, as well as targets for energy efficiency in the thousand most highly emitting corporations. This relates to the issue of additionality, which has been discussed extensively for years. While unilateral investments do not clearly discard the additionality of projects, they do not support it either. It is entirely possible to identify unilaterally financed CDM projects that are truly additional and which also include the purchase of foreign equipment., However, the problems the CDM community faces in finding sufficient evidence of early CDM consideration to ensure project registration – and the recent EB response[5] requiring notification to the national DNAs of project consideration – illustrate concerns that motivations are being tampered with.

The present records in the market also compromise the initial intentions regarding technology transfer, as the majority of projects undertaken by local investors seem to employ local technology, thus bolstering the argument that these projects are building on traditional investment motivations and that CDM registration is regarded as an opportunity associated with the usual business.

5 In accordance with the EB41 report Annex 46, the national DNA should be informed of any CDM project within six months from the start date of the project. The announcement is valid from 2 August 2008. http://cdm.unfccc.int/EB/041/eb41_repan46.pdf

It is left it to readers here to determine how best to interpret the additionality consequences of the prevailing unilateral financing. The present author believes that the additionality test, as presently administered by the EB, is not an efficient guardian of the environmental integrity of the Protocol. More importantly, however, the issue is how to address this unilateral investment drive and bring CDM back to its original idea of promoting investment and technology transfer. Other structures may be more suitable in ensuring the original aim of promoting technological and financial transfers from Annex-I to non-Annex-I countries.

Solutions to the problem

De-regulate CDM

There are several ways to approach this issue. The idealistic approach would be to attempt to divert Annex-I investment capital from its present use into CDM activities. It is clear from the above that the emissions-constrained entities will be the very last to move on such an agenda, standing last in the queue of investors that pursue opportunity. Clearly, CDM investment so far has not been regarded as an opportunity by many Annex-I investors. The reason is that CDM can never be seen in isolation. Traditional investment drivers are paramount, and the addition of the opportunity provided by carbon credits is regarded as secondary – or, more appropriately, is considered an extra risk to the extent that business models depend on it. If the fundamental investment drivers are not attractive, then even a significant prize linked to the carbon credits cannot bring investors on board. It cannot turn a bad risk into a good risk: the chances of winning do not increase with the size of the prize.

It can also be argued that the more complicated and unpredictable the approval mechanisms for CDM become, due to a continuous flow of retroactive alterations of the rules, the more the CDM decision parameters are – and should be – marginalized compared to the core investment. And if they were not, the market should marginalize itself as being too unpredictable and too politically motivated.

Thus, to reintroduce the CDM as an opportunity in itself, the rules of the game must be significantly de-bureaucratized. Such a move would in particular mean abolishing the additionality test and common practice analyses. This may not have as drastic consequences as might be assumed. According to an assessment of the developing countries' ability to generate CERs based on their domestic project financing capability, the annual generation capacity for energy, waste and HFC projects is about 250-300 million CERs annually (Lütken and Michaelowa (2008) pp. 119-23). This figure can be increased by a number of factors. In particular, the inclusion of energy efficiency projects will have a positive effect on this figure, and other, smaller sectors may add equally to generation capacity. In fact, however, this assessment indicates that the CER generation capacity of developing countries may well be close to exhaustion when compared to the September 2008 UNEP/Risoe assessment of the total generation of CERs from presently known projects. Here the estimate is about 1500 million CERs up to and including 2012 (i.e. approximately 300 million CERs annually). So loosening (or abolishing) the

…loosening (or abolishing) the additionality criterion implies no risk of flooding the market with yet another wave of credits from the big developing countries.

additionality criterion implies no risk of flooding the market with yet another wave of credits from the big developing countries. Recent records in the Chinese market seem to support this interpretation, as the number of projects requiring financing is drastically increasing.

If developing countries are close to their CER generation capacity, a total de-bureaucratization of CDM will probably not produce a significantly increased number of locally financed projects. From the investment motivations outlined above, it should be understood that local project developers should be the first to move in pursuit of opportunity. And opportunity to them, first of all, would represent the registration as CDM projects of those activities that were on their books already. In any case, domestic investors do not need as much incentive as their foreign counterparts, as they are already in the market. But eliminating risks in the CDM system may attract the foreign financing that is presently evading the CDM. The result of such a move may be the fostering of more projects with a more cutting-edge technology content. It would also help overcome the backlog of projects that are presently stranded in a clogged validation and registration system which causes project owners increased losses by the day and compliance buyers unnecessary uncertainty as to how many credits will they actually be able to realize through their Emission Reduction Purchase Agreements (ERPAs). The value of such a move in terms of smoothening system operation could even outgrow the value in terms of improved technology transfer through greater foreign investment.

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Technology requirements

But there are other, more top-down ways of shifting the balance towards greater financial and technological transfers through CDM. The problem with all of them is that they will reduce the eligibility of locally initiated projects. If, for example, indigenous technology is excluded from registration, it would logically improve the relative share of foreign investments in CDM not because of increased foreign investment, but because of lower registration of locally financed projects. This would also be a logical consequence if a global common-practice analysis was introduced. Most locally financed projects are common-practice or business-as-usual projects and only seldom incorporate unfamiliar technology. Requiring the employment of transferred technology would immediately render a significant number of projects ineligible. To the extent that local investors respond to such requirements, the CDM would respond to its original aim of fostering technology transfers. But the immense controversy in excluding developing countries' own technology from CDM cannot be overlooked. Why require foreign technology if the local technology is comparable with or even outperforms the Annex-I technology? The answer to that question, of course, is that there is no need for technology transfer in such cases. If technology transfer rather than emissions reductions[6] should be the objective and driving force behind CDM, then there should be nothing wrong in this distinction between technologies, as the CDM in those areas is apparently not necessary.

It is difficult to say to what level a technology requirement in the CDM would reduce CER supply. It might go as high as 70-80% if we look at the number of projects that are presently based on local technology. But some of the loss

6 Because the emissions reduction motivation behind CDM is already weak.

may be recovered through an increased interest by foreign investors in bringing in technology. Carbon prices would in all likelihood increase significantly with a reduced supply of CERs and thus improve the case for a number of high-tech technologies that cannot compete against local low-cost and lower efficiency technologies, where such options exist.

If this requirement was combined with the above proposal for de-bureaucratization of the CDM, there could be a significant drive for pursuit of opportunity from Annex-I technology manufacturers for bringing in their technology in non-Annex-I countries. This, of course, would depend on the conditions that might be attached to the technology transfer, whether this would be on a single project basis, or have a more programme-like approach that could ensure some sort of actual transfer of technological competencies to the local setting rather than just general technology diffusion. Such conditions, of course, could also deter technology providers from supplying their technology if the requirements for giving up licenses or other rights are too steep.

Sector-based approaches with technology agreements

A last option would be to accept that unilateral investment will remain the prime driver of CDM until the limits of unilateral financing capacity are reached – which may well be at just about the present level. However, if more sectors are opened up for reduction activities such as international transportation, a larger share of the Gross Fixed Capital Formation would be activated for emissions-reduction activities and thus increase supply options. It could be appropriate to structure such new sectors in a more sector-wide approach. Sector-benchmarking, however, may be difficult in many sectors due to uneven distribution of the sector activities. This would be the case for some non-Annex-I countries, in particular China, labelled as the factory of the world with only a few comparable sectors elsewhere. The energy production sector, however, may on the face of it have better conditions for benchmarking among countries, as energy demand is uniform, though at different levels and for different purposes among countries. A sector approach, or maybe a sub-sector approach, would not change the financing and technological structures *per se*, but it could promote possibilities for larger scale government intervention through bilateral or multilateral agreement. Another argument for addressing the energy sector is its significance in terms of emissions, as well as the immense lock-in issues that the energy sector represents. A decisive technology-transfer strategy could avert investments in outdated technology[7] and produce significant prevention of GHG emissions.

Bilateral or multilateral intervention in energy sectors could materialize as technology-transfer agreements, i.e. supported investment programmes. They should depend on private-sector choices of technology, as the public sector has a bad track record in pinpointing the most prospective technologies for development. But the intervention should remain a government-controlled and government-regulated roll-out activity, with generation of CERs not for the private market but for intergovernmental exchanges of credits between the recipient and the bilateral or multilateral technology transfer partner. In that manner, technological agreements and government support could be weighed against the value in emission credit terms, while not necessarily counting ton by ton. Such agreements would be evaluated by the Executive Board, or more appropriately by other

7 The IEA assesses that developing countries will need US$5 trillion of investments in energy infrastructure up to 2030, according to the Energy Investment Outlook for 2003.

institutions that are better suited for dealing in intergovernmental affairs. The technology and financial transfers would be secured through international agreement. They would probably crowd out individual, stand-alone, private-sector CDM initiatives in the sector, though local private financing would still be involved in the activities included in such government-driven programmes. The private sector would still be responsible for the base financing corresponding to the business-as-usual scenario.

In some sense, this might correspond to the Global Environmental Facility's (GEFs) 'incremental cost' approach, but the scope, level of financing and above all the break from single-project approaches distinguishes this idea from the GEF. For all means and purposes, it addresses both technology transfers and the present unilateral financing imbalance. It has the potential to produce significant amounts of additional emissions reduction that can benefit Annex-I national emissions accounts, which may or may not come out as more generous national allocation plans. In any case, the Annex-I private sector will be left with a smaller share of non-Annex-I Gross Fixed Capital Formation for the generation of CERs due to the reservation of a large share of it for government-to-government initiatives. This could promote a demand-driven shift towards more sustainability-focused projects, depending on how the bilateral agreements on the technology transfer for emissions reduction are translated into national allocation plans.

Conclusion

The options outlined above may not be particularly sophisticated, but they address the unilateral financing problem in different ways: 1) a bottom-up approach to increase bilateral projects, including de-regulation of CDM; 2) a reduction in the eligibility of unilateral projects' through technology requirements; or 3) a top-down approach to force efficiency gains in a sector which is most relevant for the energy sector. Option one may marginally increase the supply of CERs. Options two and three would decisively reduce it.

If the opportunity-driven unilateral financing of projects indicates a less convincing additionality argument, such a reduction would improve the environmental integrity of the mechanism. That would correspond to a devaluation of the CERs from CDM projects. Devaluating CERs by allowing e.g. only 70% crediting of CERs corresponding to a 30% compulsory retirement would, however, not bring in additional benefits in terms of technology transfer. Such devaluation might not help increase prices on carbon either. In fact, it might do just the opposite, as the crediting value of CERs would be devaluated so that it would take more CERs to produce the same level of compliance. If it is true that developing countries produce CERs close to the limit of their investment capacity, an increase in CER supply may be less likely, but the price effect may still be the same, i.e. negative. Compared to this scenario, some of the technology approaches may fare better.

But how would the different approaches address the investment motivation among project promoters? The de-regulation will work as an encouragement for all market agents to pursue a mechanism that, through such a move, will increase its image as an opportunity. Obviously, abolishing the additionality test would immediately lead to accusations of a further reduction in the environmental integrity of the mechanism and the Protocol. The paradox is that, by creating such increased motivation for pursuit of opportunity, particularly for foreign investors, new projects may materialize,

Table 2. Different approaches to altering the CDM and their effects on CERs and investment flows

effect / model	Technology transfer	Sustainability	CER supply	Effect on relative bilateral investment
De-regulate CDM	Minor increase	No effect	Minor increase	Minor improvement due to increased FDI
Technology requirements	Significant increase	No effect	Significant decrease	Significant positive effect due to ineligibility of many common practice projects
Sector-based approaches	Significant increase	No effect – possibly small positive derived effect	Significant decrease, but significant increase in emissions reduction through government trades	Significant positive effect due to requirements of bilaterally financed technology transfer

i.e. projects that did not happen before and therefore can be said to be additional. Once non-Annex-I investors have exhausted their CER generation capacity in investment terms, the risk of registering more business–as-usual projects is insignificant. Hence, paradoxically, eliminating the additionality test could lead to more additional projects!

If technology requirements are introduced, it will shift the picture significantly. Non-Annex-I investors can no longer restrict the pursuit of opportunity to the registration of a project activity that would have been undertaken in any case. Now, the requirements will also enforce a change of technology, which may be regarded as a risk to the original venture. Assuming that corporate investment decisions are equally emergent in a developing country setting, it raises the stakes for employees to propose non-conventional investment ideas. If corporate investment decisions are less emergent and more deliberate in such settings, the employees' responses to management information requirements will resemble a threat, which eliminates non-conventional proposals like adopting expensive and unfamiliar technology. It will, however, also foster a new situation for technology suppliers in Annex-I countries in seeing improved conditions for placing their technology in non-Annex-I markets. A stronger drive would lead to more opportunity-driven ventures. Also, Annex-I developers may follow the trend in pursuit of opportunity based on what to them is familiar but high-end technology.

Finally, in the sector-based approach the picture is more diverse. The opportunities here are defined

as top-down, though the technology choices will still be based on private sector input. The pursuit of opportunity is at first within the Annex-I corporations, i.e. the technology providers, not the emissions-constrained entities, but the pursuit is with technology 'placement', i.e. prioritization. The roll-out of the technology transfer is the real prize for the technology provider. Depending on the design of the model, the technology transfer provisions may equally be seen as an opportunity by the recipient. But the recipient need not be the project owner: it may be a technology recipient identified through more or less public intervention, or even be a public sector entity like a university or a research institution. Hence the structures of motivation become much more complex, though the overriding driver of motivation is top-down international agreement and non-Annex-I domestic regulation.

The main message is that overcoming the predominant unilateral investment characteristics of the CDM requires initiatives that improve the motivation for pursuit of opportunity among the Annex-I technology providers and developers. As it is not realistic to improve the overall investment climate in non-Annex-I countries, initiatives must focus on regulation within the climate regime to change investment drivers. Such new regulation must represent options for pursuit of opportunity in a form that is recognized and accepted by the industry and other market agents, who are supposed to increase their attention towards a CDM with more obvious promotional and regulatory characteristics for the transfer of technology.

It should be recognized above all, however, that the regulated entities in Annex-I countries are not the target for the CDM, as they will only react to the threat of regulation, and a threat does not entail responses in the form of investments outside existing scopes and strategies. Therefore, future regulation should more precisely address those entities, Annex-I and/or non-Annex-i, that see emissions reduction as an opportunity.

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References

FCCC/CP/1998/MISC.7 at http://unfccc.int/resource/docs/cop4/misc07.htm)

http://cdm.unfccc.int/EB/041/eb41_repan46.pdf

Public-Private Infrastructure Advisory Facility (PPIAF), World Bank. The Private

Participation in Infrastructure Database (Accessed November 2007). http://ppi.worldbank.org/explore/ppi_exploreRegion.aspx?regionID.1.

Butler, Richard et al. (1993): Strategic investment decisions, Routledge ISBN 0-415-07507-6Hb.

Lütken and Michaelowa (2008): Corporate Strategies and the Clean Development Mechanism: developing country financing for developed country commitments. Edward Elgar 2008.

IEA (2003): World Energy Investment Outlook 2003, Chapter 7. International Energy Agency.

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THE CLEAN DEVELOPMENT MECHANISM:

Assessment of Experience and Expectations for the Future

Abstract:
With the aim of promoting further the CDM's objectives, now is the time to look back and review the performance of the international rules and to consider possible improvements to the mechanism for the period after 2012. To this end, the paper provides an overview of the requirements for CDM projects by the Kyoto Protocol and the Marrakesh Accords. It then assesses the performance of CDM projects based on current practice regarding six aspects: emission reductions, sustainable development, environmental impact, technology transfer, geographical distribution and transparency, efficiency, and the effectiveness of the system in operation. Expectations for the post-2012 CDM regime are proposed. Finally, proposals on the scaling-up of the CDM are discussed and some initial thoughts considered.

Seven years have passed since Marrakesh, where the basic framework of the international CDM regime was established and the first commitment period begun. After the registration of the first-ever CDM project on 18 November 2004, the market has witnessed both a rapid boom in CDM project registration in 2006 and flat or even stagnant development since 2007. To date, more than 1100 projects have already been registered with expected annual emission reductions of more than 220 million tCO2e, and a review has been requested for about 400 projects, a rather significant share. All major procedures within the CDM regime have been well tested and significant experience gained.

At its first session, the COP/MOP initiated a process to consider further commitments for Annex I Parties for the period beyond 2012 in the form of an open-ended adhoc working group.

Acknowledging the great contribution of the CDM in mitigating emissions and promoting sustainable development in developing countries, and bearing in mind also various criticisms of the mechanism, at its fifth session the working group agreed that emissions trading and the project-based mechanisms under the Kyoto Protocol should continue to be available to Annex I Parties as means to meet their emission reduction targets and could be appropriately improved.

Now is the time for the international community to look back and review the performance of the international rules in promoting the CDM's goals and consider possible improvements to the mechanism for the period after 2012.

To this end, the paper first provides an overview of the requirements for CDM projects. It then assesses the performance of the CDM projects in the context of these requirements, including both achievements and challenges, based on up-to-date international practice. Expectations for the new CDM regime after 2012 are proposed. Finally, proposals on the scaling-up of the CDM are discussed and some initial thoughts considered.

Requirements for CDM Projects

Under the Kyoto Protocol, the CDM was established for two purposes: to assist non-Annex I Parties in achieving sustainable development, as well as contributing to GHG mitigation, and to assist Annex I Parties in achieving compliance with their quantified emission limitation and reduction commitments. It is also required that each CDM project should result in real, measurable and long-term emission reductions, additional to any that would occur in the absence of the project.

- Under the Marrakesh Accords, some of these requirements were elaborated further:
- a CDM project is additional if GHG emissions are reduced below those that would have occurred in the absence of the project;
- it is the host Party's prerogative to confirm whether a CDM project assists in achieving sustainable development;
- project participants need to assess the environmental impact of the underlying project and, if those impacts are significant, an environmental impact assessment should be conducted in accordance with procedures, as required by the host Party;
- CDM projects should lead to the transfer of environmentally safe and sound technology and know-how;
- there is a need to promote equitable geographical distribution of clean development mechanism project activities at the regional and sub-regional levels.

Furthermore, for the CDM to make a significant contribution in these respects, the whole CDM system should operate in a transparent, equitable, efficient and effective manner.

The performance of the international CDM regime is assessed, therefore, in accordance with the following aspects:

1) Expected additional emission reductions;
2) Contribution to the sustainable development in the host country;
3) Environmental impact;
4) Contribution to technology transfer;
5) Equitable geographical distribution;
6) Transparent, equitable, efficient and effective operation of the CDM system.

Assessments of the Current CDM Regime

1) Expected additional emission reductions

Up to now, the expected annual emission reductions of more than 1100 CDM projects

that have already been registered have exceeded 220 million CO2e, a little more than the annual emissions of the Netherlands. Projects currently in the pipeline have almost the same emission reduction potential. It could be seen that CDM has been a great success in terms of promoting the mitigation efforts in developing countries and in reducing the cost to developed countries of complying with their emission reduction targets under the Protocol.

There is, however, also much criticism about the additionality of some types of registered projects. Since the final decisions on the registration of CDM projects and issuance of CERs are made by the EB (and not by a technical committee such as the Registration and Issuance Team), questions have been raised as to whether EB members, who are usually from government agencies, have the necessary expertise to make the right decisions. There are even suspicions that key decisions are being made on a political basis. The current additionality assessment requires that the specific situations of each proposed project should be verified and assessed, while the baseline scenario identification requires the determination of a hypothetical scenario. Both of these are processes involving subjective judgment and are by no means easy, although relevant evidence and the underlying logic involved should be presented and validated. EB members may be inclined to make a judgment based on their impressions of and preferences for the particular technologies a project proposes to use, rather than on the evidence.

Furthermore, since requests for a review have been made for an increasing proportion of the projects proposed, the uncertainties regarding registration and issuance have grown from the project proponents' viewpoint. As a result, it is not easy for investors to take the incentives deriving from CDM into serious consideration when making their investment decisions. Some of them may prefer to make decisions without considering the CDM factor at all, while try to reap possible windfalls afterwards. The respective decisions of the EB and of investors will inevitably affect each other negatively, and both parties may find themselves confronted with a dilemma.

…more and more investors, especially those in the renewable energy sector, are starting to take the CDM factor seriously when making their decisions.

2) Contribution to sustainable development in the host country

In terms of numbers, more than half of the already registered CDM projects fall into the energy sector, with renewable energy projects accounting for the majority; about 20% are for waste handling and disposal sector, while more than 10% deal with fugitive emissions from fuels and manufacturing industries. It is clear that most of the projects belong to sectors that have significant direct benefits in terms of sustainable development. In reality, more and more investors, especially those in the renewable energy sector, are starting to take the CDM factor seriously when making their decisions, and CDM is thus playing an effective role in promoting the development of relevant industries and thus low carbon and sustainable development in the developing countries.

Some types of project, especially those dealing with GHGs from the chemical industries, have been heavily criticized by some because of the alleged lack of any contribution to sustainable development in the host country. Discussions

at the EB and the COP/MOP on relevant methodologies have also been at a stalemate for quite a long time. The difficulties of such discussions are still greater due to the potentially significant mitigation potential of relevant projects and their potential impact on the regional distribution of CDM projects. However, it is quite clear from the Marrakesh Accords that it is the host country government, not any other organization, who should determine whether or not a CDM project assists the host country in achieving sustainable development. Furthermore, there is no agreed definition of sustainable development. A mechanism could also be established to strengthen the contribution of such types of project to the sustainable development in the host country. For example, China has already established the China CDM Fund, most of the income of which comes from the share of revenues from sales of CERs by CDM projects dealing with end-of-pipe gases. The fund is being used to support activities dealing with climate change in the country. It can be seen that these types of project might also contribute significantly to sustainable development in the host country. Another important issue to be considered is that these types of project do not face the additionality challenge that many other types face and thus should not be excluded from the CDM.

3) Environmental impact

For countries without environmental impact assessment rules in place, the environmental impact assessment requirement will undoubtedly provide an incentive for the assessment. For countries with such rules in place, the requirement could promote the more effective implementation of these rules. In some of these countries, although the laws or regulations require relevant projects to undertake environmental impact assessments, these laws and regulations are poorly implemented in some sectors and regions, and many projects have started construction or even operation without such assessment being carried out or appropriate approval having been granted by the relevant authorities. To comply with the CDM requirement, project developers have to follow the host country requirements on environmental impact assessment.

4) Contribution to technology transfer

Technology transfer is not a mandatory requirement for CDM projects. According to a paper prepared for the UNFCCC secretariat in 2007, roughly 39% of all CDM projects (both registered and proposed), accounting for 64% of the annual emission reductions, claim to involve technology transfer, which usually involves both knowledge and equipment. This is a quite high ratio, indicating that CDM has clearly promoted the transfer of technology to developing countries.

It should be noted, however, that equipment imports account for most of the claimed transfers. Imports of equipment do not necessarily bring technology or know-how to the host countries, and most of them occur on a normal commercial basis. Without CDM, equipment imports and any associated transfers of know-how would also happen. The contribution of CDM to technology transfer, therefore, should be assessed on the basis of additionality, just like the emission reductions. Under this assumption, CDM has only promoted technology transfer in a very limited number of projects or types of project, for most of which the major purpose is to mitigate GHG emissions, for example, projects using low-concentration methane-oxidization technology.

5) Equitable geographic distribution

Currently, more than 60% of registered CDM projects are hosted by countries in Asia and the Pacific, more than 30% in Latin America and

the Caribbean, and less than 5% in Africa and other regions. Although some efforts, including south-south assistance, have already been made to promote the regional balance of CDM project distribution, much more still needs to be done. CDM is a market mechanism, and the private sector considers market potential and cost rather than regional balance when seeking potential projects. So developed country governments should shoulder the major responsibility for promoting CDM projects in regions that are currently taking less advantage of the mechanism. It should be noted, however, that regional balance means promoting project development in regions such as Africa without limiting it in other regions.

6) Transparent, equitable, efficient and effective operation of the CDM system

Operation of the current CDM system, especially the performance of the DOE, the secretariat, the Meth Panel, the EB, etc., is currently faced with a great deal of criticism.

Up to now, fewer than twenty organizations have obtained designation by the COP/MOP as DOEs. Given that about 2000 projects are still in the pipeline and more than 1100 projects have entered the stage of verification and certification, all the DOEs have actually been overburdened with the validation and certification work for quite a long time. This causes delays and sometimes a poor quality of work, and thus the loss of CERs for some projects with operation time before registration. For those DOEs with offices and local staff in the major developing countries, such delays to work are very serious. It often happens that projects cannot be submitted for registration before the deadline for old versions of methodologies, and thus the project proponents have to change the methodologies or versions of methodologies and go through the whole validation process again.

The technical capacity of the DOEs is also causing concern for many. Although the accreditation procedure for a DOE is very strict and lengthy, many validators of DOEs, especially those in local offices in the host country, actually do not have adequate capacity for their work. The situation became even worse because of rapid turnover of experienced validators. Dealing with inexperienced validators is a genuine nightmare for project proponents. The absence of suitable internal training within the DOE is part of the problem.

Imports of equipment do not necessarily bring technology or know-how to the host countries, and most of them occur on a normal commercial basis.

Internal procedures of the DOE related to validation, verification and certification also need to be clearly laid down and presented transparently to project developers. In many cases, project proponents may find themselves lost in the DOE's internal procedures, without knowing where their project has got to and who they should contact in case of need. Coordination between the DOE's headquarters and its local offices should also be strengthened. In many cases, the headquarters and the local offices could both sign a contract with project owners in the same country, but project owners may find later on that their projects are being treated differently in the local offices and the headquarters.

By its very nature, the DOE should behave neutrally and adhere to the rules laid down by the COP/MOP and the EB. It should neither establish new rules for the CDM itself nor come up with new ideas or create new requirements (for example,

key custom, or promise of project numbers) that may affect their neutral operation.

The secretariat is mainly being criticized for its low level of efficiency. It very often happens that projects must wait about two months just for completeness checks by the secretariat in the case of request for registration. This may mean a significant CER and income loss for the project proponents.

In order to calculate precisely the emission reductions that have been achieved by a specific CDM project, the Meth Panel and the EB have developed very complicated methodologies and tools. However, some of the requirements of many approved methodologies are either not very clear or not appropriate, and thus have created barriers to these methodologies being utilized. In the case of energy efficiency-related methodologies, for example, by 24 September 2008, no project had been published on the UNFCCC website for global stakeholder consultation as part of the validation process for more than ten approved methodologies, a very significant proportion. This reflects clearly the difficulty of using some approved methodologies and the need for approval of the current methodology approval procedure. Furthermore, complicated methodological requirements also mean that project proponents should have strong technical capacity, which may impede the development of CDM projects in certain areas.

With regard to the EB, besides other issues, the registration process is being criticized severely for its unpredictability and inconsistency. Some projects receive registration automatically, while other similar projects are reviewed for general issues which are equally relevant to the former. A more serious concern is that, in some cases, certain issues have already been discussed and settled by the EB during the process of project review, while requests for review are raised again for the same reasons.

Another challenge facing the current CDM market is the uncertainties regarding market demand and price, especially whether or not the CDM will continue to exist after 2012. These uncertainties have already affected the continuation of efforts to develop CDM projects.

Expectations for the Future

A future CDM regime should address effectively the current challenges the mechanism is facing.

First, the mechanism should be more efficient, equitable, transparent and simplified, should provide greater certainty to project investors, and should contribute more to technology transfer. The efficiency of the whole system, including each major procedure, should be improved. Similar projects should be treated similarly, and balanced regional distributions of CDM projects should be promoted. Rules should be more transparent and clearer, leaving less room for subjective judgment by relevant actors, and thus providing enough certainty to investors for them to consider CDM more seriously. Environmental integrity should in no case be sacrificed: on the contrary, it should be strengthened.

Second, to create certainty for market demand and price, developed countries should not only commit themselves to deeper mitigation targets, but also formulate and implement clear policies on the utilization of CERs.

Third, CDM methodologies should be simplified significantly for the purpose of easy application, not focusing too much on precision, but providing better opportunities for conservative

choices to be chosen by project participants. The project proponents should at least be given the flexibility to choose between complicated precision and conservative simplification.

Fourth, it may be worth considering the possibility of modifying current institutional arrangements, for example, through a reallocation of responsibilities among different participants in the system. Given the workload and work quality of the DOEs, accreditation procedures should be simplified to increase the number of DOEs, while periodical assessment should also be carried out in order to make sure that DOEs have the necessary technical capacity and appropriate internal quality-control procedures. Another possibility is to establish more restricted but clearer responsibilities for DOEs and remove some of their current responsibilities to other organizations. For example, the role of host country governments could be strengthened on certain issues, including clarification of the mandatory legal requirements for certain types of project, dissemination rates for certain technologies, environmental impact assessment and stakeholder consultation requirements, etc. in the host country.

Fifth, the EB should strengthen its executive role on the mechanism, mainly, for example, by providing the necessary and clear guidance to Parties, DOEs and project participants, as well as a systematic review of the issues that commonly arise in the project cycle, together with the necessary clarification and guidance. It should avoid becoming intensively involved in the discussion of specific projects, which should mainly be left to the relevant technical committees. To facilitate the work of the EB, its members should also possess the necessary expertise.

Sixth, the role of external experts, especially industry experts, should be strengthened with a view to improving considerations of reality and reflecting it better.

Seventh, a stronger, more professional, efficient and neutral secretariat should be established, its main focus being to support the EB.

....some of the requirements of many approved methodologies are either not very clear or not appropriate, and thus have created barriers to these methodologies being utilized.

Eighth, the additionality test could be removed for certain identified technologies, for example, wind power. This will provide the certainty that project investors require to make investment decisions and thus continuously promote the development of the relevant sectors. At the same time, environmental integrity could be achieved on a macro level through conservative baseline setting.

The key aim of all future improvements should be to provide the necessary climate to promote the use of low carbon technologies through the mechanism, on the condition of assured environmental integrity.

Scaling-up the CDM

Scaling-up the CDM is now one of the focuses of discussion about the future CDM regime. It is advocated for various reasons, including ensuring the greater involvement of developing countries, addressing international competitiveness concerns and increasing the supply of low-cost

mitigation credits. The CDM was established for two reasons, namely to promote sustainable development in the host developing countries, and to assist developed countries to achieve their mitigation targets under the Kyoto Protocol. It should not be expected to shoulder responsibilities other than these two, such as promoting the greater involvement of developing countries or addressing international competitiveness concerns. Other issues should be considered as part of other right forums than the CDM.

…to create certainty for market demand and price, developed countries should not only commit themselves to deeper mitigation targets, but also formulate and implement clear policies on the utilization of CERs.

There are many proposals for the scaling-up of the CDM, many with different names, but they can basically be divided into four categories: absolute target-based crediting mechanism, intensity-based crediting mechanism, policy and measure-based crediting mechanism, and technology-based crediting mechanism. For all of them, the underlying logics are the same, i.e. first establish a baseline, and then compare the baseline with the actual performance of relevant sectors to determine whether or not emission reductions could be generated, and if so, the amount of emission reductions. Furthermore, in all cases the baseline and follow-up assessment approaches should be reviewed and approved through relevant international procedures; if the pre-established target is not achieved, no penalty will apply. The major difference between these approaches is the format of the baseline, i.e. absolute targets, intensity targets, policy and measures implementation or technology implementation.

For an absolute target-based crediting mechanism, the political readiness of developing countries to accept it is the major challenge. Furthermore, the establishment of a reliable baseline depends on a precise projection of future emissions, that is, the product of the output and emissions intensity per unit product, of the associated sectors. Such projections, however, have been proved by history to be very difficult if not impossible tasks, especially for rapidly developing countries. This being the case, one possible solution is to establish a loose target that may be accepted by the host country, but the question is how to ensure that real additional emission reductions can be achieved.

An intensity-based crediting mechanism is more acceptable to developing countries from the political point of view compared with the absolute-target based approach. The technical difficulties, however, remain the same. For sectors with lots of heterogeneous products, it may be necessary to establish different baselines for different project types, which could be very time-consuming. Data availability is another key challenge for this approach. For most developing countries, publicly available and reliable information that is necessary for the establishment of the baseline is always a serious challenge. This is even true for most large developing countries, which people think should have more complete statistical systems and stronger technical capacity. To ensure that credits will be issued for additional emission reductions remains another great challenge.

A policy and measure-based crediting mechanism seems to be acceptable to developing countries politically. The major challenge is how to assess the emission reduction benefits of a specific policy or measure: emission reductions are the result of many integrated factors, and it is very difficult to separate out the effects and attribute them to different factors.

There are different understandings of a technology-based crediting mechanism. One is that projects utilizing certain technologies are automatically considered eligible under the CDM and thus could generate emission reduction credits, i.e. the additionality test is waived for such projects. The risks of free-riding and exaggeration of emission baselines and thus emission reductions could be eliminated through the careful selection of eligible technologies, the careful determination of relevant emission baselines, and the strong participation of host country governments and relevant national and international industry associations. Furthermore, before developing a project, the project developers could know in advance the eligibility of their projects under this mechanism and the rough amount of emission reductions their projects should achieve, which could encourage the realization of emission reduction potentials in relevant industries. Compared with the current CDM, more data are needed. However, through the participation of the host country governments and the industry associations, this may not be a huge challenge. Alternatively, only technologies for which relevant information is available will be included in the eligible list. For project developers, the data requirement will be greatly reduced and will mainly concern general project-specific technical information. Such data could be rather easily accessed and verified by the validators. Such an approach, given its direct association with technologies, could promote the transfer of technology to developing countries from developed countries more effectively. For example, one possibility is that the emission reductions associated with the application of eligible technologies transferred from developed countries will be allocated to the latter, while the receiving developing countries could benefit from the associated local sustainable development.

Conclusions

The CDM is serving its dual purposes well while also facing many challenges, including increasing uncertainties regarding registration, its limited contribution to technology transfer, the uneven regional distribution of projects, and necessary improvements to the transparency, efficiency and effectiveness of the system in operation. The post-2012 CDM regime should try to address these challenges above all else. The CDM should adhere to the purposes for which it was established, i.e. assisting developing countries in achieving sustainable development, and assisting the developed countries in achieving their mitigation targets under the Kyoto Protocol. Any future improvements to the rules should be directed to achieving these goals better. The mechanism should not be expected to shoulder other responsibilities not laid down by the Protocol.

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REFORMING CDM AND SCALING-UP

Finance for Sustainable Urban Transport

Abstract
Improvement of urban transport systems in developing countries has an enormous potential to mitigate greenhouse gases while addressing other urgent environmental, social and economic issues. However, the transport sector is not well represented in the Clean Development Mechanism (CDM) portfolio. There appears to be opportunities to improve the CDM by broadening its scope and simplifying its rules. Furthermore, there is an urgent need to develop improved policy instruments to enable expanded international cooperation. A strategy to reform the CDM and scaling up carbon finance to foster sustainable urban transport is outlined in this paper.

Transport and climate change

The Kyoto Protocol entered into force in 2005. A year earlier, global anthropogenic emissions amounted to 49 GTCO2-eq. These emissions were 25% higher than in the early nineties, when the United Nations Framework Convention on Climate Change (UNFCCC) was adopted. Global greenhouse gas (GHG) emissions could triple in 2050 compared to the levels reached in 2004 if no additional climate change policies are implemented (IPCC, 2007).

The transport sector is one of the largest and fastest growing GHG sources. Between 1970 and 2004, global GHG emissions from the transport sector increased by 120% globally, reaching 6.4 GTCO2-eq (13.4% of the total). While industrialized countries still hold the largest share of GHG emissions from the transport sector,

With the current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades.... Two thirds to three quarters of this increase in CO2 emissions is projected to come from non-Annex 1 countries...."
Intergovernmental Panel of Climate Change

Intergovernmental Panel of Climate Change

emissions from developing countries are growing rapidly. Between 1990 and 2002, transport-related CO2 emissions doubled in China, Indonesia and South Korea. Looking ahead, the International Energy Agency (IEA) expects soaring increases in China (143%), Indonesia (122%), India (91%) and Mexico (71%) by 2020 compared with current levels (IEA 2006).

In addition, transport is the major source of urban air pollution. Air pollution in cities throughout developing countries affects the health and well-being of billions of people as well as the environment. Poor air quality results in hundreds of thousands of premature deaths and billions of dollars in medical costs and lost productivity each year (CAI 2007).

Scientific knowledge, as well as current and projected levels of air pollution and emissions rates of greenhouse gases in urban areas of developing countries, confirms that there is a critical need for integrated, forward-looking, comprehensive measures to improve air quality and minimize the risks associated with climate change at the local, national, regional, and international levels (GAP 2008, CAI 2007).

As the impacts of air pollution and climate change on public health and the environment are better understood, the need to adopt strategies that recognize the importance of effectively integrating climate change and air-quality considerations into social and economic development planning becomes more apparent. Burning fossil fuels is the most common source of both greenhouse gas and air pollution emissions. Furthermore, air pollutants like black carbon and tropospheric ozone, which are largely associated with transport emissions, are greenhouse gas substances too (GAP 2008). Win-win integrated strategies to address both issues are needed to succeed in fostering sustainable transport interventions at the local level.

Sustainable transport interventions are needed to enhance accessibility rather than just mobility. Enhanced accessibility is essential to continued economic progress. The transportation system and its context need to be addressed as a whole to develop effective solutions. Transportation services enable economic development by facilitating the mobility of people and goods. Economic growth, which is reflected in increased industrial activities and income consumption, creates transport impacts. Transport can produce negative economic, social and environmental impacts, as well as positive externalities. Left unrestrained, these impacts and its causes can inhibit transport services, thus compromising sustainable development (Molina et al., 2002, WBCSD 2007).

For the vast majority of urban areas in developing countries, public transport continues to be the largest mode of transportation. A combination of economic growth, high motorization rates, poor quality public transport systems, exacerbated metropolitan sprawls and replication of unsustainable life-styles is rapidly changing this panorama. An accelerated expansion in both the number and use of low-capacity modes (such as private cars or motorcycles) and a drastic diminution of the ability of public transport systems to satisfy overwhelming mobility demands are generally observed in cities in developing countries.

There are important barriers that need to be overcome if we are to succeed in moving on to more sustainable transport patterns. Nations and cities need support to overcome substantial barriers. Support is needed to develop visions and policy frameworks, develop more integrated programs, strengthen and integrate transport agencies and land-use planning agencies, and overcome institutional fragmentation by improving mechanisms between transport, environment and urban planning.

There is also a need to develop the capacities of transport operators, as well as to improve business conditions to implement sustainable transport practices. More complete regulatory frameworks and their enforcement can create incentives for private sector investments. Cleaner technologies and alternative fuels require good business models, regulations and incentives. More appropriate priority settings could lead to improved finance to support sustainable transport interventions.

Improved and scaled up finance instruments are needed to mitigate GHG and achieve multiple co-benefits by fostering sustainable transport in developing countries. There is a growing consensus that the Clean Development Mechanism (CDM) in its current form has not sufficiently effective so far for achieving this purpose. It has been found that it is possible to introduce innovations under the current framework to improve the CDM as it applies for transport. Nevertheless, there is a need to develop improved financial and other policy instruments if the forthcoming global agreements on climate change are to be effective to addressing the urgent transport sector challenges.

Now is the time for the international community to look back and review the performance and experiences in applying the CDM to the transport sector and consider decisions to be made to either improve the mechanism and/or develop alternative instruments for the new climate change regime after 2012.

To this end, the paper first provides an overview of an ongoing participatory process to develop a strategy to improve CDM and to scale-up international finance instruments to foster sustainable urban transport. It then assesses the performance of CDM transport projects and identifies key issues limiting its development, including both achievements and challenges. It also identifies opportunities for CDM to be improved under the current framework, as well as expectations for the new climate change regime

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after 2012. Finally, proposals on the scaling-up of the CDM are discussed and some initial thoughts considered.

Building a strategy to improve CDM and to scale-up finance to foster Sustainable Urban Transport

For the first time, an international multi-stakeholder effort is underway to build a consensus on a strategy for: a) making CDM a more viable tool to finance transport interventions; and b) to ensure the development of improved clean transport funding mechanisms under the forthcoming climate change negotiations. Representatives from Designated National Authorities, Designated Operating Entities, International Development Agencies, investors, transport operators, transportation agencies and non-governmental organizations, as well as transport and environment experts from Asia, Europe, Latin America and North America, are participating in this effort, which has been led by the Clean Air Institute, with support from the Carbon Fund Assist Program (CF-Assist).

The current project-based approach for CDM is having a limited impact on the transportation sector…… Developing methodologies to capture accurately the complexities of urban transport, at the project level, has proved to be very complex, time-consuming and costly.

The aim is to identify the decisions and actions necessary to enhance the effectiveness of CDM in the transportation sector, and to propose an action plan for strengthening the overall framework for CDM for 2012 and beyond.

In general terms, this has consisted in a review of the CDM framework as related to projects, a consultation meeting held in Washington DC, and a CDM & Transport workshop held in Berlin in June 2008.

Nearly 60 participants representing a broad spectrum of carbon finance stakeholders were involved in the consultation process. In addition, the Clean Air Institute consulted with nearly 25 international experts, including international transport and environmental specialists, staff from the World Bank and the Inter-American Development Bank, project proponents, bilateral agencies and private-sector organizations, as well as a CDM Methodology Panel member.

Some of the major findings to emerge from these processes are as follows:

- The current project-based approach for CDM is having a limited impact on the transportation sector. Moreover, even if successful, the impact of individual CDM transport projects is relatively small. Developing methodologies to capture accurately the complexities of urban transport, at the project level, has proved to be very complex, time-consuming and costly.
- The determinations of the baseline scenario and the demonstration of additionality are the most significant barriers to developing CDM transport projects. There are also significant challenges regarding the reliability and availability of data, as well as the capacity for data collection in the transport sector.
- The current CDM process should be made more attractive for project proponents and investors by broadening its scope, simpli-

fying and improving data collection and methodologies, and removing or minimizing barriers, such as the additionality requirement. For example, there is the possibility to use the "first of its kind" approach (an existing provision under the current CDM procedure) to meet the additionality requirement.

- Any effort to improve the existing CDM program should serve as a basis for creating more effective instruments for the transport sector for post-2012. In general, the new instruments should be top-down, of broad scale, specific to the transport sector, account better for co-benefits, and foster the incorporation of climate change considerations into local and national policies and policy instruments.

> *""…the present system of mobility is not sustainable, nor is it likely to become so if present trends continue. Societies need to act to alter their direction. This is true, in particular, if mobility is to be made sustainable in the developing world."*
> *World Business Council for Sustainable Development*
>
> *World Business Council for Sustainable Development*

As a result of these findings, a Strategy on CDM and Transport (the Berlin Strategy for short) was proposed. The Berlin Strategy is organized in two parts. First, a set of reforms and new programs should be adopted within the existing CDM framework. Secondly, new carbon finance instruments should be developed for the post-Kyoto era.

Since Berlin, stakeholders have continued to meet and are moving forward, using the Berlin Strategy as the foundation to persuade the Conference of Parties (COP) to improve the ability of the transport sector to receive carbon financing. As an example, the Clean Air Institute (CAI) recently participated in the Asian Development Bank Transport Forum, which was held in Manila from September 8-12, 2008. During that week, discussions were held with key stakeholders regarding the recommendations related to CDM and transport and how to translate those recommendations into action. As a result of those discussions, the strategy developed in Berlin was enhanced and then presented at the last day of the Forum.

There is a consensus among stakeholders about the importance of submitting the Berlin strategy outlined above at COP 14 to be held in Poznan in December 2008. In order to be discussed and adopted by the COP 14, the Berlin Strategy is in the process of being translated into a proposed draft decision document containing the necessary directives to be issued. Furthermore, the decision document is intended to contribute for discussions to be held in the COP 15 in Copenhagen in 2009, where a new climate change framework is to be discussed.

CDM transport projects and methodologies

Transportation was set as a priority for the CDM by the COP 10 held in Buenos Aires in 2003. Unfortunately, four years after COP 10, transport is still not well represented in the CDM project portfolio. Of the roughly 1191 CDM

projects registered by November 2008 according to the UNEP Risø Pipeline (see http://www.cdmpipeline.org), there are only two involving urban transport:

- The first project to be registered was TransMilenio (Phase II to IV), which is a Bus Rapid Transit System (BRT). A BRT is a high-capacity bus system that delivers efficient, safe, rapid services through dedicated lanes, rapid boarding, enclosed stations, real-time information displays, etc.

- The second transport project activity to be registered under the CDM is a small-scale project in India using the AMS-III-C methodology. The Delhi Metro Rail Corporation installed low GHG-emitting rolling stock (Metro locomotives and coaches), which have a regenerative braking system that improves energy efficiency.

Table 1 provides additional information of these CDM-registered projects.

Currently, five transportation-sector methodologies have been approved by the CDM Executive Board, which are shown in Table 2. There are still no CDM projects approved for three of these five methodologies.

There appears to be a growing consensus that the CDM, as currently structured, is not well suited as a financing mechanism for sustainable urban transportation in developing countries.

Table 1

Public Transport CDM Projects Registered by the CDM Executive Board

Registration date	Description	Methodology and scale	Host Parties	Other parties	Reductions Ton/year
07 Dec 06	BRT Bogotá, Colombia: TransMilenio Phase II to IV.	AM0031 (large scale)	Colombia	Switzerland Netherlands	246,563
29 Dec 07	Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system	AMS-III-C (small scale)	India	Japan	41,160
Total emissions reduced (tons/year)					287,723

Source: CDM Executive Board.

Table 2

Transport Sector Methodologies approved by the CDM Executive Board

Methodology Number	Description
AM0031 (large scale)	Applicable for the construction and operation of a BRT system for urban road-based transport, as well as extensions of existing BRT systems. The BRT methodology is the only large-scale methodology in the transport sector.
AM0047 (large scale)	Production of biodiesel based on waste oils and/or waste fats from biogenic origin for use as fuel – Version 2
AMS-III-C (small scale)	"Emissions Reduction by Low GHG Emitting Vehicles"
AMS-III.T (small scale)	"Plant Oil Production and Use for Transport Application"
AMS-III.S (small scale)	"Introduction of Low Emission Vehicles to Commercial Vehicle Fleets."

Source: CDM Executive Board.

Key Barriers to CDM Project Development

Two proximate types of reasons explain the lack of CDM projects in the transport sector:

1. It is much more complex to deal with diffuse transport-sector emissions than with stationary sources. Moreover, in the transport sector, there are different types of sources, multiple actors and emissions, which depend on utilization conditions.
2. The current CDM procedures are very complex and not well adapted to the sector.

For a project to be eligible, it has to demonstrate that is able to achieve "real, measurable and additional reductions". For a project to be registered, the project proponents should (Dalkman, 2007):

- Set a baseline, which is the scenario representing the greenhouse gas emissions that would occur in the absence of the proposed project activity.
- Prove project additionality, which implies that project proponents should demonstrate that the emissions reductions achieved are proved to be additional to any that would occur in the absence of the certified project activity.
- Identify and calculate leakage, which should describe the net change in green-

house gas emissions which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity.

Setting the project baseline and proving additionality are difficult tasks because it is hard to demonstrate that a transport project is being implemented because of climate change considerations. First, it must be demonstrated that, within the project activity, GHG emissions are reduced to a level below what would have occurred in a "business as usual" situation. Then, a test must be run to identify the financial barriers that would prevent the implementation of the proposed project activity. But the financial impact of the CDM registration is very limited, and the results of the barrier analysis are usually not considered convincing because the carbon credits usually represent less than 2% of the infrastructure investment. Under these circumstances, in most cases there are difficulties in demonstrating that a project would not have proceeded without CDM.

In addition, there are also significant challenges regarding the reliability and availability of data, as well as the capacity for data collection in the transport sector. Studies are proportionally expensive compared to project costs. In some cases, the data required is limited or even does not exist. There also are complexities associated with estimating key indicators, such as projections of the number of passengers to be transported or the expected mode switch.

…the financial impact of the CDM registration is very limited, and the results of the barrier analysis are usually not considered convincing because the carbon credits usually represent less than 2% of the infrastructure investment. Under these circumstances, in most cases there are difficulties in demonstrating that a project would not have proceeded without CDM.

Data complexities are exacerbated in projects that address fundamental structural changes such as infrastructure projects. These challenges could create overwhelming barriers to CDM project development in the vast majority of developing countries, especially those with poor data and low experience and capacity (Barías et al., 2005; Dalkmann et al., 2007).

Opportunities for improvement within existing CDM framework

The current project-based approach for CDM is having a limited impact on the transportation sector. Developing methodologies to capture accurately the complexities of urban transport at the project level has proved to be very time-consuming and costly. Moreover, even if successful, the impact of individual CDM transport projects is relatively small. Attempting to measure emissions reductions at the project level is narrowly focused and prone to measurement errors, and thus not an appropriate approach for the transport sector.

Suggestions for improving the CDM as it relates to transport resulting from this international effort range from pursuing innovations within the existing CDM framework to developing programmatic and sectoral approaches, and creating an improved mechanism post-2012.

In general, the current CDM process should be made more attractive for project proponents and

investors by broadening its scope, simplifying and improving data collection and methodologies, and removing or minimizing barriers, such as the additionality requirement.

It is possible to use the existing "first of its kind" approach to meeting the additionality requirement. Under "first of its kind," a new type of project or approach can be deemed to meet the additionality requirement if no (or limited) project activity of its type is operational in the region or country. For example, relatively few cities have extensive BRT networks, and a convincing argument can be made that a certain number of new BRT projects could be deemed "first of their kind."

The "first of its kind" approach should be pursued for the transport sector and presented to the Methodologies Panel. There are significant issues regarding how to implement the "first of its kind" approach, including an estimate of baselines for each project, and these issues should be addressed promptly for discussion with the Methodology Panel.

Developing programmatic and sectoral approaches

A Program of Activities (PoA) is made up of CDM Programme Activities (CPAs). CPAs are similar to project activities that: a) apply the same approved baseline and monitoring methodology; and b) involve one type of technology or set of interrelated measures. Multiple CPAs can be included under a PoA at the time of registration, and additional CPAs can be added at any point in the life of the PoA.

The PoA has its origins in a decision of the COP/MOP that local/regional/national policies or standards cannot be considered as CDM project activities, but that project activities under a PoA can be registered as a single CDM project activity, provided that:

- approved baseline and monitoring methodologies are used that, inter alia,
- define the appropriate boundary, avoid double-counting and account for leakage,
- ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity

The approval of programmatic projects currently appears to be as complicated as the project-based approach, and additionality continues to be a barrier. An improved standard transport methodology could be developed for its application to a PoA. The implementation of the programmatic approach for transport should simplify data requirements, improve data collection, and minimize barriers such as the additionality requirement. There is a need to explore further how to design a POA consisting of individual projects under

Program of Activities

A Programme of Activities (PoA)
-often called Programmatic CDM)- is:

- a voluntary action
- coordinated by a private or public entity
- implementing a policy/measure or stated goal (i.e. incentive schemes and voluntary programmes),
- resulting in mensurable GHG emission reductions or avoidance that are additional to any that would occur in the absence of the PoA.

Source: http://cdmrulebook.org/pageID/452http://cdmrulebook.org/

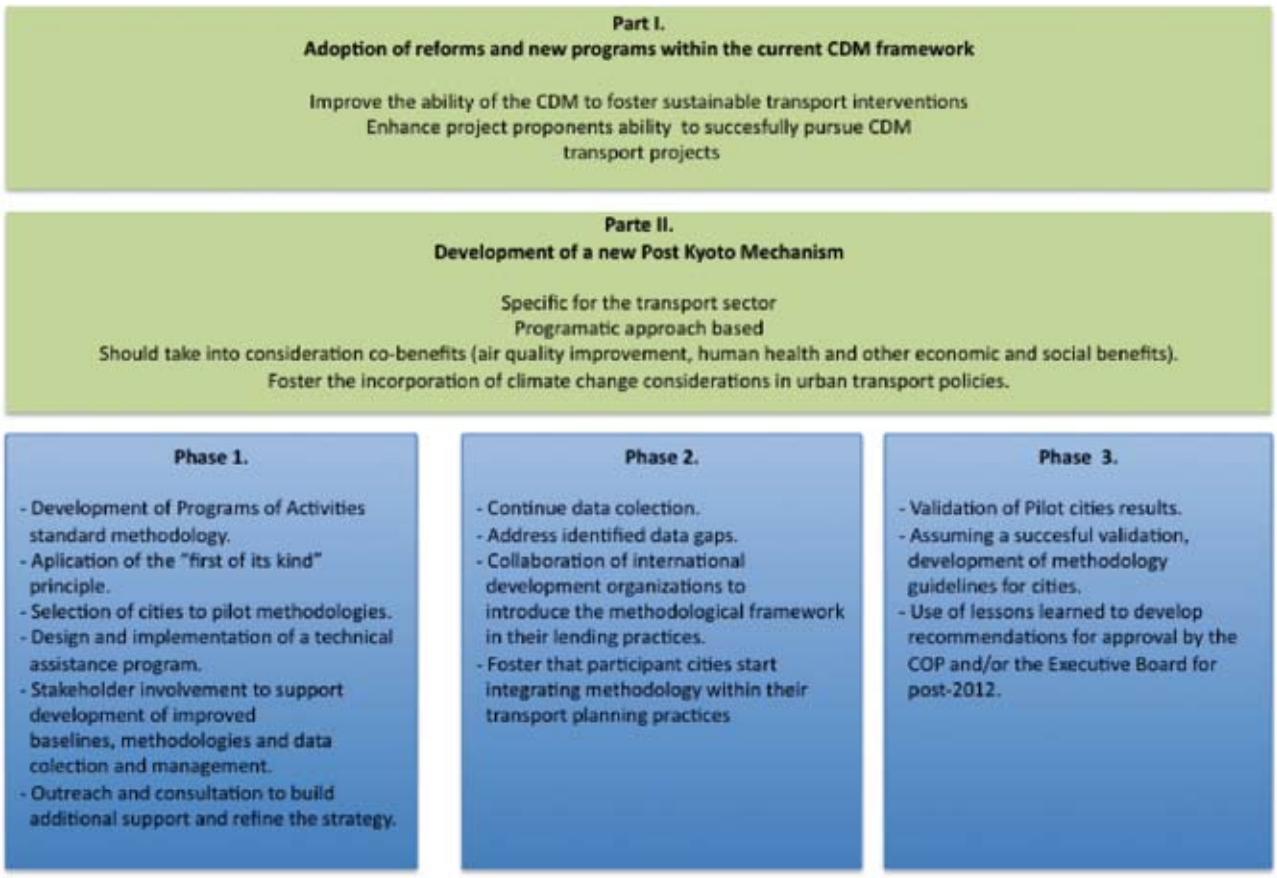
an integrated sustainable transport program approach, such as public transport pedestrian and bicycle improvements, improved land use, transport demand management and freight management, as well as technology and fuel improvements.

The transition from the current project-based approach to a broader programmatic or sectoral approach should be accomplished in phases. For example, the first phase could be a methodology applied to the public transport system of a city. Once a methodology has been verified, other transport programs or systems could be added to the methodology.

Berlin Strategy: Improving CDM and scaling up financial instruments

A two-part strategy is proposed and should be pursued in parallel (see Figure 1). First, a set of reforms and new programs should be adopted

Figure 1.
Berlin Strategy: Improving CDM as a first step to scale up Carbon Finance Sustainable Urban Transport



within the existing CDM framework. These reforms and programs should be designed to: a) enhance the ability of CDM as an instrument to promote sustainable transport interventions; and b) improve the ability of project proponents to successfully pursue transport CDM projects.

Secondly, a new mechanism should be developed for the post-Kyoto era that is specific to the transport sector; uses a broad scale rather than a project-specific methodology; takes into account the co-benefits of transport projects, such as improved air quality, human health, and economic opportunity; and encourages cities to link local transport planning with planning for greenhouse gas emissions reductions, perhaps through a combination of regulatory requirements and incentives.

A three-phase program could be implemented to facilitate the actuation of this two-part strategy. In Phase I, a program of activities would be developed under the existing CDM framework and a standardized methodology would be applied to that program, taking advantage of the "first of its kind" methodology to meet the additionality test. A limited number of cities would be selected to pilot the methodology. A technical assistance program would be created to support the development of better baselines and monitoring capabilities, including data collection and management.

In Phase II, more detailed data would be collected and data gaps identified in the pilot cities. International financial organizations would collaborate to begin integrating the methodological framework into lending practices, and cities would be encouraged to begin integrating the methodology into their transport planning. An international fund to support data collection, tools development, mitigation options, research and mainstream should be established to support these efforts.

In Phase III, the results from the pilot cities would be validated. Assuming successful validation, methodological guidelines would be developed for use by other cities. Moreover, lessons learned from the program would be used to develop recommendations for approval by the COP and/or the Executive Board post-2012.

Scaling-up finance to foster sustainable urban transport

The major challenges of the new global agreement on climate change to be discussed at the COP 15 in Copenhagen by the end of 2009 are the role that developing countries will play in the global mitigation effort and the adoption of appropriate financing mechanisms (DEFRA 2008).

According to the UNFCCC, to get global emissions in 2030 back to today's levels, the additional investment and financial flows (I&FF) required are estimated to be around US$200-210 billion. The transport sector will require 42-44% of this I&FF (UNFCCC 2007).

Instruments like CDM in its current form appear to be insufficient to reach these funding requirements, since they lack the scale needed by several orders of magnitude. There are claims that traditional sources of funding, like the funds administered by the GEF, are inadequate for this purpose because "they fail to link funding with performance or success; they are typically slow and cumbersome; and they lack the scale necessary" (DEFRA 2008).

Scaling up the magnitude requires significantly broadening the scope of policy instruments to address climate change issues. Among other

Box 1

Sectoral Approach Models

The IEA has identified four models of sectoral approaches:

1. **No-lose sectoral targets and crediting mechanism. Developing** countries adopt non-binding quantitative sectoral goals. Excess emission reductions are eligible as credits to be sold to industrialized countries to help them meet their fixed and binding targets.
2. **SDPAMs or policy-based instruments .** Sector-specific policies and measures in developing countries that have sustainable development as primary objective (SD-PAMs). It provides funding for SD-PAMs that reduce emissions beyond Business As Usual. It should be done with measurable, reportable and verifiable (MRV) actions. Binding or non-binding
3. **Transnational sectoral agreements.** Transational agreement for a given industry
   The substance of these agreements is the adoption of quantitative and/or qualitative goals. This model is oriented to foster concerted Research and Development (R&D) effort.

urgent decisions, it is necessary to adopt a strategic program approach to low carbon investments, which has to be able to aggregate on-the-ground activities in an unprecedented manner.

Any effort to improve the existing CDM program should serve as a basis for creating more effective instruments for the transport sector post-2012. In general, these instruments should be program-oriented, of broad scale and not project-specific. The new instrument should:

- Be specific to the transport sector rather than of broad applicability, as with the current CDM.
- Better account for national and local benefits and the project's contribution to sustainable development.
- Seek to integrate planning for CDM projects with transport and urban planning for cities by focusing on improving accessibility rather than just mobility.
- Foster the incorporation of climate change considerations into local and national policies and policy instruments to encourage emissions reductions in the transport sector more strongly.

The IEA has identified four models of sectoral instruments that in conjunction can help to scale up financing in those sectors and sources where an abatement potential exists in developing countries (see box 1). One of these models is the Sector No-Lose Targets (SNLT's). SNLTs are conceived as a scaled-up carbon finance mechanism, major features of which are (DEFRA 2008):

- It is based on 'cap and trade' emissions trading schemes for industrialized countries, complemented by schemes that allow credits to be generated through emissions reductions and sink enhancement activities in developing countries.
- Targets would be adopted voluntarily by some developing countries for particular sectors. The 'no lose' feature means that developing countries would not face compliance penalties if they did not meet their SNLTs.
- Targets would be agreed as part of a quantitative multilateral agreement.
- The concept of additionality would no longer apply because the fixed and binding targets of industrialized countries would be set in the light of the scale of credits that would be

expected to be generated by SNLTs from developing countries.

- So, SNLTs (and the credits that may stem from them) are explicitly accepted and factored into the elements of the overall agreement that set a quantitative emissions outcome.
- It could adopt 'compliance carbon' crediting 'tools' from the existing 'regular' project-based CDM and now programmatic CDM to new CDM models such as sectoral or policy CDM, which can be applied to SNLTs.
- It should be seen as part of a set of policy tools to support developing countries as a 'compliance carbon' policy tool.
- It can complement the other sectoral instruments, such as the SD-PAMs.

Whether the SNLTs are to be feasible for the transport sector requires an in-depth analysis. As with other credit-based mechanisms it is necessary with SNLTs to establish a baseline and then to measure (and report and verify) performance against this.

Towards a separate funding stream for transport-sector climate mitigation actions

The transport sector needs to improve its visibility at the climate negotiations and make a case for a separate funding mechanism for mitigation-related activities. This global transport climate change mitigation fund would pay for at least two types of work:

1. Worldwide research particularly focused at the developing world to support an integrated evaluation of transport and spatial/urban policy options, as well as to monitor their implementation.
2. Ample funding of activities to incorporate climate change mitigation and other co-benefit consideration as part of the regional and metropolitan planning, investment prioritization, long-term budgeting, etc. This funding should be independent from particular investment projects by international development agencies.

Conclusions

The purpose of CDM is not being achieved in the transport sector. There are opportunities to improve the effectiveness of CDM by broadening its scope and simplifying its rules.

There is an urgent need to couple the institutional mechanisms of interaction between the North and the South on climate change mitigation, and the needs of the transport sector.

The transport sector in particular should have a stronger seat at the table in Poznan and beyond. This could mean having a stronger push within national governments to 1) develop a better understanding of climate change within transport ministries, and 2) greater involvement of transport ministries at climate negotiations.

Any effort to improve the existing CDM program should serve as a basis for creating more effective instruments for the transport sector post-2012. In general, these instruments should be program-oriented, of broad scale and not project-specific.

For the first time, a group of multi-stakeholder representatives is joining efforts to improve the future of CDM as related to the transport sector.

In addition to CDM-related measures, there is an urgent need for international development organizations to establish sound instruments to prevent and reduce GHG emissions from transport investments. International financial organizations could play a key role by establishing such instruments and by changing lending practices to encourage more sustainable transportation projects.

There is a strong desire for the World Bank or other international organizations to assume leadership and to make the appropriate investments to ensure that these reforms are accomplished. Key stakeholders need to be actively involved in the development of these reforms.

Ultimately, the transport sector needs to have a higher profile in climate negotiations. The development of increasingly effective instruments for transport is essential to achieving climate goals.

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References

Barías, Jose Luis, Jodi Browne, Eduardo Sanhueza, Erin Silsbe, Steve Winkelman, Chris Zegras, Jose Luis (2005): Getting on Track: Finding a Path for Transportation in the CDM. Final Report. International Institute for Sustainable Development (IISD). Winnipeg, Manitoba, Canada. (http://www.iisd.org/publications/pub.aspx?id=690).

Clean Air Institute (2007). Draft Clean Air Strategy for Latin America and the Caribbean. Washington DC. (http://www.cleanairnet.org/lac_en/1415/article-72110.html).

Clean Air Institute (2008). Draft Report and Strategy to Improve the Effectiveness of CDM to Foster Sustainable Transportation. Prepared for the Carbon Fund Assist Program of the World Bank Institute. Washington DC.

Dalkmann, Holger, Wolfgang Sterk, Daniel Bongardt, Bettina Wittneben, Christian Baatz (2007): The Sectoral Clean Development Mechanism: A Contribution from a Sustainable Transport Perspective. JIKO Policy Paper. Wuppertal Institute for Climate, Environment and Energy. Wuppertal, Germany.

Intergovernmental Panel of Climate Change (2007). Climate Change 2007. Synthesis Report. An Assessment of the Intergovernmental Panel on Climate Change, Adopted section by section at IPCC Plenary XXVII. Valencia, Spain, 12-17 November 2007.

Molina Mario, Molina Luisa et al (2002). Air Quality in the Mexico Megacity: An Integrated Assessment. Series: Alliance for Global Sustainability Bookseries , Vol. 2.

UNFCCC (United Nations Framework Convention on Climate Change) (2008). Investment and Financial Flows to Address Climate Change. Bonn.

Ward, Murray. Streck, Ch., Winkler, Harald, Jung, M., Hagemann, M., Hoehne, N., O'Sullivan, R (2008). The Role of Sector No-Lose Targets in Scaling up Finance for Climate Change Mitigation Activities in Developing Countries. Department for Environment, Food and Rural Affairs (DEFRA). United Kingdom.

World Resources Institute (2005). Navigating the numbers. Washington, D.C.

Zegras, Christopher P. As if Kyoto mattered: The clean development mechanism and transportation. Energy Policy, Vol. 35, No. 10. (October 2007), pp. 5136-5150.

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Scaling Up Energy Efficiency under the CDM

Abstract:

This paper analyses the barriers to end-use energy efficiency under the CDM, presents elements of a new shared vision for a CDM that will encourage end-use energy efficiency and suggests necessary reforms in the international climate framework that go beyond the traditional conception of CDM reform. For the CDM to achieve its dual mitigation and sustainable development objectives, the Parties to the UNFCCC can no longer be satisfied with the perfect environmental integrity of a zero-sum CDM at the expense of real action on end-use efficiency. Nothing short of a global energy efficiency offensive is needed in Copenhagen in 2009.

Whereas the Clean Development Mechanism (CDM) has proved effective with respect to the objective of assisting industrialized countries achieve compliance with their emission reduction commitments, a strategic vision of the CDM to address the drivers of greenhouse gas emissions growth and contribute to the sustainable development of poor countries is lacking.

Furthermore, the CDM has been a disappointment for many developing countries. India, China, Brazil and Mexico host 75% of the total number of registered projects, whereas 90% of CERs have been issued to China, India, South Korea and Brazil. This concentration has left Least Developed Countries, Small Island Developing States and Sub-Saharan African countries with a very thin slice of the carbon market. Yet energy efficiency projects have huge potential

in countries worldwide, including the poorest – and efficient use of energy may contribute to economic development and poverty alleviation.[1] Nonetheless typically small and dispersed end-use efficiency projects face a number of barriers, both general and CDM-specific. As a result, only eighteen energy demand projects (Sectoral Scope 3) have been registered to date in only five different countries, representing 1.5% of all CDM projects and an even smaller share of issued CERs.2 This level of performance stands in stark contrast to mitigation scenarios, which typically ascribe a dominant share of mitigation in the coming decades to end-use efficiency. Action is clearly needed to scale up carbon finance for end-use efficiency.

This paper analyses the barriers to end-use energy efficiency under the CDM to date, presents elements of a new shared vision for a CDM that will encourage end-use energy efficiency and suggests necessary reforms in the international framework that go far beyond the traditional conception of CDM reform.

The Bali Road Map process has yet to acknowledge clearly the significance of energy efficiency as a primary means of mainstreaming climate mitigation and capitalizing on global convergence in brokering an effective climate deal. The Copenhagen agreement must provide the foundation for a global energy efficiency offensive, with the CDM as only one tool.

A Drop in the Bucket

The Clean Development Mechanism has resulted in 1152 registered projects, for which 183 million certified emission reductions[3] (CERs) have been issued, as well as a pipeline of another 2667 projects that are at the validation stage or have requested registration[4] (UNEP Risø CDM Pipeline, 2008).

With respect to end-use energy efficiency, the amount of CERs issued is miniscule compared to the vast savings potential. The amount of cumulative CERs expected to be issued through 2012 from the end-use energy efficiency projects that have been registered to date under the CDM is 9.68 million CERs[5] (Figure 1). In contrast, the International Energy Agency (IEA) has issued a series of 25 energy efficiency policy recommendations, which could save around 8.2 $GtCO_2$ annually by 2030 (IEA, 2008). Even if we assume that all end-use efficiency projects currently in the pipeline will be registered and deliver CERs according to design specifications, the total cumulative emission reductions from end-use efficiency CDM through 2020 only amount to 72 million tons of carbon dioxide.

Taking China (the largest supplier of CERs) as an example, 90% of issued CERs stem from industrial HFC projects (UNEP Risø CDM Pipeline, 2008). The CDM therefore has had very little documented impact on key drivers

1 The most common energy-related issue raised in national MDG reports is energy efficiency, not renewable energy or access to energy (Takada and Fracchia, 2007).

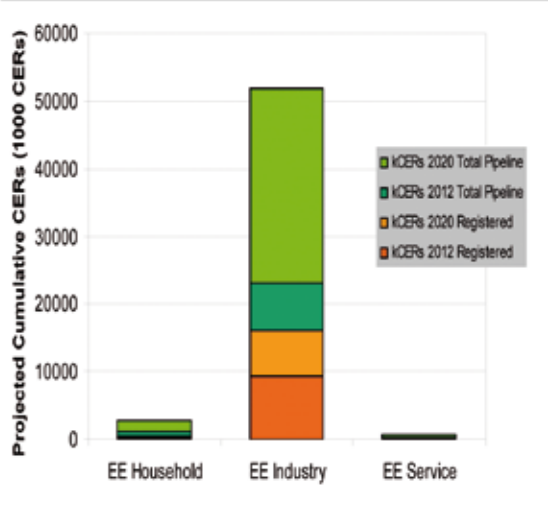
2 If we use the UNEP Risø CDM Pipeline end-use efficiency categories EE Household, EE Service and EE Industry (some of which correspond to other sectoral scopes), the fifty registered (plus project at validation) end-use efficiency projects represent just over 4% of all projects, but only 1.3% of expected CERs in 2012, as a result of their typically small size (UNEP Risø CDM Pipeline, September 2008).

3 Each CER represents one ton of carbon dioxide equivalent greenhouse gas emissions reductions.

4 Status as of 1 September 2008.

5 Included are the UNEP Risø CDM Pipeline (2008) categories EE Household (3 registered projects), EE Industry (45 registered projects) and EE Service (2 registered projects). If we consider the sectoral scope 3 (energy demand) category alone, only 18 projects have been approved, 9 rejected and a Request for Review submitted for two others.

Figure 1. Projected Cumulative CERs for Energy Efficiency CDM Projects in 2012 and 2020



Data Source: UNEP RISØ CDM PIPELINEUNEP RISØ CDM PIPELINE (2008).

of China's greenhouse gas emissions growth,[6] which, in light of ongoing standard-of-living improvements, can only be curbed through greater energy efficiency, the decarbonization of energy supply and economic restructuring. The additional investments into CDM and the resulting several hundred projects currently under implementation represent a limited contribution to the challenge of transforming the Chinese energy system, measured against China's own energy policy goals and intentions to develop a low-carbon economy.

In the area of energy efficiency, the Government of China set a goal to reduce energy intensity per unit of GDP by 20% between 2006 and 2010. The government has begun to implement ten key energy-saving programmes. According to China's National Climate Change Programme (CNCCP), these ten programmes are expected to result in 550 million tons of CO_2 reductions during the 11th Five-Year Plan (FYP) period (GOC, 2008). The CDM has contributed to only one of these programs, namely waste heat and gas (WHG) recovery and utilization. Of China's 22 registered projects (which represent one-third of the global total), two projects have so far generated 768,000

…end-use efficiency projects face a number of barriers, both general and CDM-specific. As a result, only eighteen energy demand projects (Sectoral Scope 3) have been registered to date in only five different countries, representing 1.5% of all CDM projects and an even smaller share of issued CERs

CERs[7] halfway through the 11th FYP period (Table 1). There has been little or no CDM activity in other key end-use areas, such as electric motor systems, industrial process efficiency, building energy efficiency or high-efficiency lighting, which are targeted for large energy savings.

Similarly, the CDM is making only a minor contribution (less than 1%) to achieving the other targets set out in the CNCCP with the exception of wind power. Wind power has received a boost

6 With the available high-volume HFC destruction opportunities using methodology AM0001 already realized, the potential share of CERs from methane and carbon dioxide reduction projects in the Chinese pipeline is growing. Given the dominance of carbon dioxide in China's GHG emissions inventory, as well as the typically better sustainability of energy efficiency and renewable energy projects that dominate the carbon dioxide reductions, this is a welcome development.

7 These two projects are expected to generate 34 million CERs by 2012 and nearly 80 million CERs by 2020. However, their issuance success (ratio of CERs actually issued to expected CERs according to the Project Design Document) has been only 52% and 61% respectively (UNEP Risø CDM Pipeline, September 2008).

Table 1. China's Emission Reduction Targets 2006-10 and CDM Contribution (as of 1 September 2008)

Sector/Technology	CNCCP Reduction Goal	Issued CERs (Mt CO2e)	CDM Contribution to Target (%)
10 Key Energy Conservation Programs	550 Mt CO2	0.768	0.14
Hydropower	500 Mt CO2	1.058	0.21
Coal-bed and coal–mine methane	200 Mt CO2e	0.638	0.32
Advanced thermal power generation	110 Mt CO2	0*	*
Other renewable energy (wind, solar, geothermal, tidal)	60 Mt CO2	2.401	4.00
Biomass, biogas and liquid fuel	30 Mt CO2e	0.024	0.08
Increased carbon sink (aforestation, reforestation, grassland/forest protection)	50 Mt CO2e	0	0

* There is some overlap with the technologies mentioned in this category (particularly in the area of co-generation) with the energy conservation category (where we account for all CERs derived from use of waste heat or gas for self-generation). No CERs have been issued for other supply-side technologies mentioned in the CNCCP, such as small-scale distributed natural gas, advanced power transmission/ transformation/distribution technologies, or 600 MW or larger supercritical and ultra-supercritical combined-cycle thermal power plants.

Sources: China's National Climate Change Programme (2008); UNEP RISØ CDM PIPELINE (2008)

from the landmark Renewable Energy Law of the Peoples' Republic of China, which entered into force on 1 January 2006 (and subsequent regulations) and for which 2.4 million CERs have already been issued (representing 4% to achievement of the CNCCP target for "other" renewables).

Furthermore, CDM activities have had scarcely any impact on the main areas of concern in China, namely coal-fired power generation, energy-intensive industry (with the exception of WHG projects), buildings and transportation. So, the question is whether the CDM can play a more significant role in China's and other countries' transitions to an efficient and low-carbon economy.

The picture is similar for other developing countries. India recently issued its National Action Plan on Climate Change (GOI, 2008), which pointed to priority mitigation areas, such as solar thermal and PV generation, industrial energy efficiency and fuel switching, energy efficiency in the residential and commercial building sector, management of municipal solid waste, and promotion of urban public transport. Although the plan did not set national CO_2 reduction targets for these priority areas, it is clear that the number of CERs issued to date is limited compared to the potential. Neither solar thermal and PV nor transport-sector projects have generated any CERs – and only a single small-scale project has been registered under each of these priority categories. Similarly, only 2000 CERs have been issued for the single registered building efficiency project and 76,000 CERs for one of the three registered landfill gas projects. Compared with other countries, there has been relatively greater CDM activity in India's industrial sector, both end-use efficiency and WHG projects. Nearly 6.5 million

CERs have been issued from sixteen waste heat and gas recovery projects, predominantly in the iron and steel sector, 527,000 CERs from sixteen end-use efficiency projects – although these are predominantly small industrial efficiency projects with annual emission reductions of less than 30 kCERs – and 794,000 CERs from five fuel switch projects (four of which are industrial captive power plants).

Barriers to End-Use Energy Efficiency under the CDM

End-use energy efficiency is of particular interest in the context of developing country contributions to mitigation, since such activities can make an important contribution to economic and social development, while mitigating greenhouse gas and local pollutant emissions at relatively low cost. So why are these projects not being developed under the CDM? One reason is the design of the CDM itself and how the CDM provisions are being interpreted and applied in practice.

The Parties to the Kyoto Protocol have agreed that the CDM must result in emission reductions that are:

- Additional: A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.
- Measurable and directly attributable: A Designated Operational Entity must certify that the project activity achieved the verified amount of reductions in anthropogenic emissions by sources of greenhouse gases.

These rules treat the CDM as a zero sum game for the climate system at best, and are therefore not creating the necessary incentive for host countries to engage in the hard work of market transformation that is needed for sustained, large-scale change, such as introducing and rapidly updating mandatory equipment standards. Their interpretation and application has made it extremely difficult to leverage carbon finance for energy efficiency projects, particularly dispersed end-use efficiency projects with documented sustainable development benefits, for a number of reasons:[8]

Energy efficiency is often highly profitable on paper, and such projects have therefore had a tough time demonstrating additionality arising from financial and other barriers to the satisfaction of the CDM Executive Board

- Energy efficiency is often highly profitable on paper (Reddy and Balachandra, 2006), and such projects have therefore had a tough time demonstrating additionality arising from financial and other barriers to the satisfaction of the CDM Executive Board. In fact, most end-use efficiency projects would fail a classical investment analysis; however, they face other pervasive, well-documented barriers too. Many of the 29 responses to the CDM Executive Board's recent Call for Public Inputs on a draft proposal for an enhanced barrier test for project activities that have potentially high profitability without CER revenues pointed to the need to promote energy efficiency projects under the CDM, not make it even more difficult to register them.[9]

8 Many of these issues have been raised previously (Arquit Niederberger and& Spalding-Fecher, 2006), but none has been adequately addressed.

9 http://cdm.unfccc.int/public_inputs/2008/cers_rev/index.html

Table 2. Application of Approved Energy Demand Methodologies

Methodology Available Since	Methodology Reference #	Title	Number of Registered Projects
6 December 2004	AM0017	Steam system efficiency improvements by replacing steam traps and returning condensate	0
6 December 2004	AM0018	Steam optimization systems	10
25 February 2005	AM0020	Baseline methodology for water-pumping efficiency improvements	0
16 February 2007	AM0046	Distribution of efficient light bulbs to households	0
30 November 2007	AM0060	Power saving through replacement by energy efficient chillers	0
16 May 2008	AM0068	Methodology for improved energy efficiency by modifying ferroalloy production facility	0
1 November 2002	AMS II.C.	Demand-side energy efficiency activities for specific technologies	4*
1 November 2002	AMS II.E.	Energy efficiency and fuel-switching measures for buildings	5*
22 October 2004	AMS II.F.	Energy efficiency and fuel-switching measures for agricultural facilities and activities	0
1 February 2008	AMS II.G.	Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass	0
2 August 2008	AMS II.J.	Demand-side activities for efficient lighting technologies	0

*One project uses both AMS II.C. and AMS II.E.

Source: UNFCCC CDM Database (http://cdm.unfccc.int/Projects/projsearch.html), status of approval of Sectoral Scope 3 methodologies and registration of projects applying these methodologies as of 30 July 2008. Note that some of the 31 projects that apply AMS II.D. (Sectoral Scope 4) also include end-use efficiency measures. Four additional large-scale methodologies in other sectoral scopes have been approved within the past year, but no registered project activities have made use of them.

- Viable, widely applicable methodologies for end-use energy efficiency are lacking. As a result of the agreed "case-study" approach to methodology development, the CDM modalities and procedures did not provide consistent top-down guidance for "good practice" regarding the key methodological issues that are crucial to all types of energy end-use efficiency activities. Conversely, it has been difficult to have methodologies approved by the CDM Executive Board that are based on "good practice" energy-saving quantification methods used in large, government-supervised energy efficiency programmes, such as those run by utility companies and funded by ratepayer money. As a result, there is a lack of viable methodologies to support the wide array of end-use efficiency project types. The available energy efficiency methodologies have either narrow applicability, have proved impossible to apply in practice (in the case of large-scale methodologies, Table 2) or have relied on project-level monitoring of individual pieces of equipment (in the case of small-scale methodologies), which is neither cost-effective nor practical in many circumstances and discourages system efficiency improvements that yield the greatest energy savings.[10] Another trend

10 Several small-scale methodologies allow for a systems approach, but these have proved to be difficult to apply in practice (refer to Table 2). One positive new development was the approval of AMS II.J. in August 2008, which allows for energy savings and greenhouse gas emission reductions from efficient

is to burden existing small-scale end-use efficiency methodologies with additional requirements that would make them even less feasible under CDM Programs of Activities.

- It is more difficult to determine baseline emissions for end-use efficiency activities – whether under retrofit or new construction situations – than it is for energy supply, fuel switching or other types of CDM project activities. This is partly due to the interpretation of CDM authorities that trends in efficiency should be taken into account in the project baseline estimation, whereas this is not common practice in the energy efficiency world and would appear to contradict the CDM Executive Board's own clarification that national and/or sectoral host-country policies to reduce emissions that were implemented after 11 November 2001 need not be taken into account in developing a baseline scenario (CDM-EB, 2005).
- Although leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary,[11] the CDM Executive Board and its panels have not allowed project developers to account for positive "spillover" effects, which can be particularly large for end-use efficiency programs. It is not uncommon for energy savings resulting from non-participants to exceed significantly the savings directly attributable to the programme participants themselves. A programme to offset the additional cost of energy efficient compact fluorescent lamps, for example, not only makes them affordable to programme participants, but can also result in economies of scale and retail price reductions that make the CFLs more affordable – and quality improvements via bulk procurement specifications that make CFLs more attractive – to all market participants (IIEC, 2007).
- The potential CDM incentive is insufficient to cover transaction costs for typically small and often dispersed end-use efficiency actions.
- The new Program of Activities (PoA) mode of CDM implementation, which was specifically designed to facilitate programmes to provide incentives for dispersed, small-scale actions such as end-use efficiency (Hinostroza et al., 2007), has had a slow start since it was introduced over a year ago, with only one energy efficiency programme currently at the validation stage. In addition to the issues mentioned above, crucial market actors have been reluctant to embrace PoA – for example, DOEs are concerned about liability implications – and some DNAs have not created the legal framework to make it possible for them to issue letters of approval for PoA. Furthermore, potential PoA managing entities lack the necessary capacity. The recent CDM Executive Board Call for Public Input on PoA yielded 36 submissions[12] that highlight PoA implementation challenges and suggest various reforms.

lighting projects to be calculated using a "deemed" or "stipulated" savings approach, rather than monitoring the energy use and/or hours of operation of individual pieces of equipment *in situ*.

11 UNFCCC document FCCC/KP/CMP/2005/8/Add.1 (2006)

12 http://cdm.unfccc.int/public_inputs/2008/PoA/index.html

A more fundamental reason that end-use energy efficiency projects are not being developed under the CDM is that such projects face multiple barriers – some of which cannot be overcome with CER revenues or investment alone.[13] Ironically, whereas demonstration of additionality has proved to be a stumbling block for energy efficiency methodologies and project activities, non-CDM barriers have prevented numerous energy efficiency opportunities with short payback periods from attracting CDM investment in the first place. Unless a comprehensive approach is taken to address typical barriers to end-use energy efficiency in national planning processes, whereby goals, policies and budgets are set, it will be difficult for the CDM to unlock greater investment. This requires the adoption by host countries of a systematic framework for integrating energy efficiency performance objectives into national poverty-reduction strategies (Arquit Niederberger, 2006).

A more fundamental problem with the Kyoto Protocol and Bali Roadmap frameworks is that the approach has been climate-centric, with an emphasis on climate commitments, carbon markets and technology, rather than concentrating on how best to mainstream climate-friendly choices into development planning to maximize co-benefits and transition towards a sustainable society (Shukla, 2008). Focusing on mobilizing resources to overcome performance barriers related to the delivery of energy services (rather than the traditional energy supply optic) will ensure that not only are the technology and investment "hardware" issues addressed, but also the all-important "software" issues (such as public awareness, behavioural change, human and institutional capacity; and policies and measures), which are currently being neglected.

13 Arquit Niederberger and Brunner (2007) offer an example of such multiple barriers in the area of high-efficiency industrial electric motor systems, which are responsible for about 40% of electricity demand worldwide.

A Shared Vision for Energy Efficiency CDM

To transform markets so that the most energy-efficient end-use equipment rapidly becomes business-as-usual in an ongoing process should be the major thrust of a global climate change mitigation strategy. These end-use technologies are available today. They have short payback periods, have the greatest potential for cost-effective emissions reductions in the coming decades, can make decentralized renewable energy more viable, and have a range of sustainable development benefits. Achieving this vision will require coordinated efforts that go way beyond the traditional conception of CDM reform, including giving top priority to energy efficiency in the Bali Action Plan, adopting a new strategic vision of the function that the CDM can play in assisting developing countries in contributing to climate mitigation (as opposed to merely lowering compliance costs for industrialized countries), and adopting improvements to the CDM modalities and procedures.

Bali Roadmap Process

The negotiations have evolved from widespread early recognition of the importance of energy efficiency at the outset of the process to virtually no consideration of the importance of energy efficiency in the current negotiations. The discussions under the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) are not considering energy efficiency to be one of the primary *"means to reach emission reduction targets and ways to enhance their effectiveness and contribution to sustainable development"*. Similarly, the related discussions on reforming the CDM

only refer to energy efficiency as a possible "co-benefit" of CDM project activities, rather than including reforms to facilitate end-use energy efficiency project activities under the CDM.[14]

With regard to the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Parties have noted that:

> *nationally appropriate mitigation actions by developing countries should be considered in the context of sustainable development, economic growth and poverty reduction, and that support for technology, financing and capacity-building was needed to enable Parties to enhance their action, including through actions in specific sectors, in particular renewable energy and energy efficiency.*[15]

Whereas this summary of Parties' views emphasizes both the importance of energy efficiency and the fact that climate mainstreaming can only be achieved with support for the on-the-ground efforts of developing countries, the negotiations have yet to conceptualize the necessary building blocks for energy efficiency.

A massive scaling up of investment in end-use energy efficiency will require six billion decision-makers to change their investment and habitual behaviour, which is a challenging undertaking, as illustrated in Box 1.

To achieve this, the Copenhagen agreement will have to include specific provisions to promote market transformation beyond the narrow context of CDM reform, including items such as:

Box 1:

What it Really Takes: "Motor-Fuelled" Efficiency Power Plant

Making energy services more widely available by maximizing the efficiency of energy supply and end-use – an equivalent and preferable (or complementary) approach to building new power plants – will require investment decisions to shift from generators and utilities to the level of the end-user. Taking a typical "efficiency power plant" (EPP) fuelled by industrial electric motor system efficiency improvements as an example, the following rough calculations illustrate the scale of the endeavour:

- Efficiency Power Plant capacity: 300 MWe
- Potential efficiency improvement of motor system: 30%
- Number of motor systems of 25 kWh each: 40,000
- Implementation examples:
  - tens of large factories
  - hundreds of municipal wastewater treatment plants
  - thousands of small factories

This requires a scale of mobilization that is unprecedented, but the related workforce development, financial engineering and regulatory and incentive framework challenges must be tackled, or energy efficiency opportunities with low or negative marginal abatement costs will not be realized.

- Giving priority to energy efficiency in the shared vision for long-term cooperative action.
- Launching a process to develop methodological guidance on the quantification and reporting of energy savings and greenhouse gas emission reductions resulting from

14 Overcoming the barriers to end-use efficiency under the CDM was not included in the list of 26 possible CDM reforms in FCCC/KP/AWG/2008/L.12, despite widespread recognition of the problem (Arquit Niederberger, 2008), including by the CDM Executive Board.

15 Energy efficiency was also identified as a sector for consideration in the context of cooperative sectoral approaches and sector-specific actions (FCCC/AWGLCA/2008/11).

Box 2:

New Vision for the CDM in a Broader Policy Context

- Regard the CDM as one source of investment or revenue to transform markets (and the carbon market more generally, as a means of delivering proper price signals), not a silver bullet. The Copenhagen agreement must include complementary means to remove barriers to end-use efficiency and market transformation.
- Acknowledge that the rules for the CDM as currently applied do not work for many types of very desirable end-use energy efficiency projects and programmes. Hence changes need to be made regarding additionality, methodologies and Programmes of Activities (PoAs).
- Recognize that simple, robust and conservative methodological approaches to the quantification of energy savings and emission reductions from end-use efficiency efforts can ensure "real, measurable and long-term benefits related to the mitigation of climate change". Such mitigation benefits would be greater than what is achieved under the current framework, with its emphasis on accuracy, precision and attribution at the expense of implementation.
- Consider "free riders" as "early adopters" to be rewarded in the long-term effort to stimulate climate mitigation and encourage the maximization of market transformation, consistent with the two objectives of the CDM.
- Encourage developing country Parties to establish realistic, yet aggressive goals for CDM financing of poverty alleviation strategies, which would facilitate climate mainstreaming in development strategies and inform buyers/investors of country priorities.
- Mobilize concessional resources to support capacity-building, methodology development and business model development, e.g. training for potential PoA managing entities.
- Create a qualified industry regulator made up of full-time staff (not acting as country or regional representatives) with a clear mandate and budget that will allow the body to deal with issues independently and on an ongoing basis.
- Re-define the role of the CDM regulator to take more of a top-down approach to energy efficiency CDM evaluation by drawing on the vast expertise within the energy efficiency community and market participants engaging in commercial activity.

policies, standards, codes, programmes, initiatives and projects, with special attention to energy efficiency.

- Ensuring that energy efficiency becomes one of the key action areas for climate change mitigation by both developed and developing country Parties. This might include provisions related to:
  - Requirements to adopt National Energy Efficiency Action Plans and/or to undertake enhanced reporting on energy efficiency policies and measures (guidance on such plans and reporting would need to be developed).
  - Reforms to the project-based mechanisms of the Kyoto Protocol that will allow carbon finance for energy efficiency activities to be massively scaled up.
  - Mechanisms to ensure sufficient human, institutional and financial resources to raise public awareness, encourage behavioural change, and design, implement and enforce the necessary policies and measures in the context of development strategies.
  - Commitment to implement specific energy efficiency policy recommendations, such as the IEA Energy Efficiency Policy Recommendations (IEA, 2008) and those of the Expert Group on Energy Efficiency (EGEE, 2007).
  - Technical work on subjects such as the harmonization of energy efficiency testing procedures, key performance indicators and benchmarking for key sectors, stipulated savings, and quantification of energy savings.
  - International cooperation and partnerships.

New Vision for the CDM

Despite its stated dual objective, the CDM has come to be regarded as a zero sum game, with a focus on generating CERs for Annex I compliance. This is unfortunate, because the CDM could make a real contribution to greater mitigation by developing countries if the emphasis were shifted to maximizing CDM performance with respect to market transformation and sustainable development goals. In the big picture, what goes on outside the project boundary in host countries with respect to drivers of emissions growth is much more important than what goes on inside it, yet the current CDM framework does not encourage positive spillovers or provide for the evaluation of market effects.

One of the prime objectives of CDM reform, therefore, should be to strengthen the role of the CDM in assisting developing countries to achieve sustainable development and contribute to the ultimate objective of the Convention. This will require action by host countries, for example, to develop plans to leverage carbon finance to implement their development strategies[16] (Arquit Niederberger, 2006). The financial mechanisms that emerge from the Bali Roadmap will need to support the necessary strategic, capacity, project and methodological development, particularly in poorer countries. The elements of a new vision for CDM are outlined in Box 2:

But it will also require correcting some of the contradictory concepts and practices that have crept into the CDM rulebook. The CDM Executive Board provided a clarification that national and/or sectoral host country policies to reduce emissions implemented after 11 November 2001 need not be taken into account in developing a baseline scenario (CDM-EB, 2005). Yet the CDM Methodology Panel and Small-Scale Working Group have repeatedly required that proposed new end-use efficiency methodologies specifically account for energy efficiency improvement trends and free-ridership in the baseline. This practice is in direct contradiction with the Board's clarification, which further specified that the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place. If the CDM is to assist developing countries in contributing to mitigation, then "early adopters" and progressive governments must be encouraged in the long-term effort to stimulate climate mitigation, not penalized.

A more fundamental reason that end-use energy efficiency projects are not being developed under the CDM is that such projects face multiple barriers – some of which cannot be overcome with CER revenues or investment alone.

Treatment of leakage was mentioned above as another area of inconsistency. A further manifestation of this is that the Small-Scale Working Group has ruled that greenhouse gases as defined in Paragraph 1 of the UNFCCC, but not included in Annex A of the Kyoto Protocol (e.g., CFCs, HCFCs), must be taken into account in considering leakage in so far as the CDM project activity results in an increase in emissions of those gases. This would appear to contradict the CDM Executive Board definition of leakage, which

16 An innovative approach taken by China was to require that the proceeds from CDM be shared with the government for re-investment in climate change activities, with a greater share going to the government for non-priority project types.

refers to the net change of emissions. Replacing outdated refrigerators and space heating and cooling equipment that rely on fluorinated gases[17] as refrigerants (and as blowing agents in insulation material) offers opportunities for large additional greenhouse gas emission reductions, if proper incentives can be offered for end-of-life refrigerant recovery. There are 1.2 to 1.5 billion domestic refrigerators currently in service, representing an estimated bank of 100,000 tons of CFC-12, for example, and approximately 75% of their service refrigerant demand continues to be CFC-12 (UNEP/TEAP, 2006). Montreal Protocol (MP)–funded activities do not address post-production use of MP gases. As a result, although suitable alternatives have been available since the early 1990s, CFC refrigerators continue to be manufactured, sold and serviced because end users are excluded from MP support by the funding criteria. Other fluorinated gases (HFCs, HCFCs) used as substitutes also contribute significantly to the greenhouse effect. Allowing CERs to be generated for the reduction in CFCs and HCFCs at end-of-life could increase the financial viability of one subset of small energy efficiency projects with relatively high transaction costs and also address an important source of greenhouse gas emissions that is not covered by any international agreement. This could be done simply by considering these gases in the context of net leakage.

It will also require greater attention to CDM reforms that are needed to scale up carbon finance for end-use efficiency actions. The lists of possible improvements to the CDM coming out of the August 2008 round of climate talks in Accra included 26 suggestions to enhance the effectiveness of the CDM and its contribution to sustainable development and to protecting the climate system.[18] Yet, not a single suggestion addressed the documented challenges faced by end-use efficiency projects under the CDM. Clearly, there is a disjuncture between the emphasis placed on energy efficiency and renewable energy in the context of negotiations on developing country mitigation actions under the AWG-LCA, and the related CDM reform discussions under the AWG-KP.

Key CDM Reforms Needed for Energy Efficiency

The Executive Board continues to explore approaches to create a more enabling environment for implementing energy efficiency project activities under the CDM and has requested the secretariat to initiate work on ways of facilitating the registration of energy efficiency activities under CDM modalities and procedures.[19] Yet two recent suggestions by the CDM Executive Board are worrisome: (i) the draft CDM Validation & Verification Manual instructs DOEs to determine, in the course of project validation, "whether or not the project activity would have been undertaken without the incentive of the CDM", which is quite a divergent concept from the way in which it is defined, namely "a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity"; and (ii) consideration of an "enhanced barrier test" for project activities that have a potentially high profitability, which could make it even

17 Industrial fluorinated gases include hydrofluorocarbons (HFCs) that fall under the Kyoto Protocol Annex A and chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) that fall under Paragraph 1 of the UNFCCC – all of which are greenhouse gases.

18 FCCC/KP/AWG/2008/L.12

19 See Annex 13 to the Report of the 41st session of the CDM Executive Board for a status report.

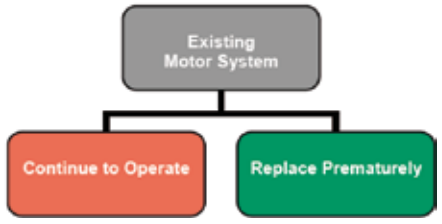
more difficult for energy efficiency activities to leverage carbon finance as discussed above.

The demonstration of additionality of end-use energy efficiency projects or programmes has been one of the main barriers to methodology approval and CDM registration of such projects. Energy efficiency projects tend to have very short payback periods, primarily as a result of reduced energy costs (Arquit Niederberger and Brunner, 2007), so they cannot typically demonstrate additionality on the basis of financial analysis.

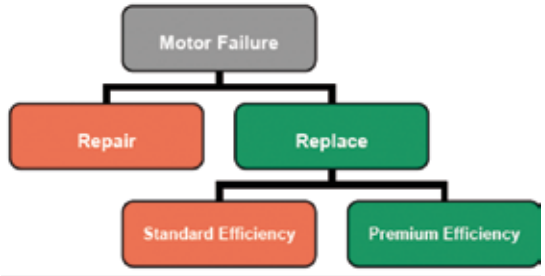
New ways of addressing additionality concerns for energy efficiency projects are needed. To begin with, it is important for additionality to be considered from the perspective of the technology end-user in the decision-making context in which he/she is operating, not some hypothetical ideal. The generic choices facing a plant owner can be illustrated using the example of industrial electric motor systems (Arquit Niederberger and Brunner, 2007):

Figure 2. Motor System Investment Decisions Facing Plant Owners

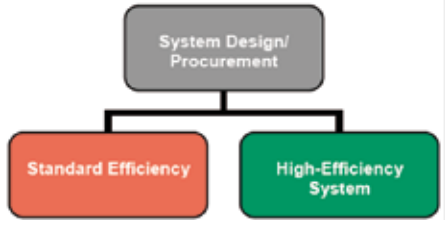
Discretionary Retrofit



Planned Replacement



New Installation/Facility



Source: Arquit Niederberger & Brunner (2007)

…the CDM has come to be regarded as a zero sum game, with a focus on generating CERs for Annex I compliance. This is unfortunate, because the CDM could make a real contribution to greater mitigation by developing countries if the emphasis were shifted to maximizing CDM performance with respect to market transformation and sustainable development goals

- Discretionary retrofits can involve just the motor or the entire system. The basic choice facing an enterprise is the continued operation of existing motor (system) vs. retrofit with new equipment (Figure 2). The most plausible baseline is continued operation of the existing equipment, which has already been amorticized, since the alternative would result in additional investment costs, plant downtime, lost revenue and technology risks.

- Planned replacement is almost always only focused on the motor, core system or other discrete technology, as the entire system rarely fails all at once. The basic choice facing an enterprise at the time a motor fails is repair vs. replacement (Figure 2). For the replacement option, the basic question is whether the replacement motor should be at the standard efficiency level in the given market – dictated by a minimum energy performance standard or prevailing practice – or whether to aim for premium efficiency. Availability is often a limiting factor in this choice, since plant downtime represents a loss of income: if high efficiency models are not stocked by distributors, they are not an option. Similarly, it is quite common for production facilities to keep reserve motors in stock, so the baseline is provided by the efficiency of these motors.
- New construction would normally involve the entire motor system. The basic choice facing an enterprise is to aim for business-as-usual (BAU) efficiency as opposed to a high-efficiency system in the design and procurement process.

Looking at the additionality question from the perspective of the end-user highlights the need to differentiate between the discretionary retrofit, planned replacement and new installation and construction markets. Some specific recommendations on additionality provisions are the following:[20]

- Generally exempt end-use efficiency retrofit projects and programmes from the requirement to demonstrate additionality, as a strong argument can be made that retrofit projects always face additional cost, financial and related risk barriers, which the CDM (via investment or CER revenues) can help to overcome.
- Under the SSC rules, it is necessary to demonstrate at least one barrier listed in Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities. Attachment A should be expanded to include specific provisions for end-use efficiency projects, such as the following proposal: *"It is recognized that barriers to end-use energy efficiency are significant and pervasive. Therefore, end-use efficiency project activities that represent discretionary retrofits to functioning equipment or systems are considered a priori to be additional. With respect to planned replacements (at the time of equipment failure) and new installations, the investment barrier can include a higher up-front purchase price, even if the project activity would represent a financially more viable alternative to the baseline when accounting for savings in energy costs over the lifetime of the project."*
- The CDM Executive Board should prepare with expert input a dedicated tool to demonstrate the additionality of end-use efficiency projects or programmes using barrier analysis for integration into large-scale methodologies. This tool would have to adopt the basic premise that barriers to end-use efficiency exist, as is well documented and evidenced by the fact that investments in end-use efficiency are not being made, despite

20 Refer also to submissions at http://cdm.unfccc.int/public_inputs/2008/cers_rev/index.html

their short payback periods.[21] Such a tool might include the following elements:

- Checklist of relevant, generic barriers to end-use energy efficiency. The Checklist should include a description or justification of each barrier, drawing on the extensive documentation available in the published literature. This would mean that common barriers would be well-documented or justified once from the top down and that each project would then only need to provide evidence that a barrier selected from the Checklist applies in the specific project context (without having to justify each time that the barrier is real, which is a large source of inefficiency and inconsistency in the current framework).
- Top-down pre-determination of additionality, based on barrier analysis, for important large-scale energy-efficiency programme types (e.g., utility DSM programmes, ESCO or leasing schemes, energy efficiency financing facilities, government procurement and municipal infrastructure investment programes, rebate and financial incentive programmes, incentives under voluntary agreements) or specific guidance on how to demonstrate the barriers for such programmes. Some initial considerations regarding how to demonstrate the additionality of utility DSM programmes have already been drawn up (Arquit Niederberger and Fry, 2007).
- Specific documentation requirements for barrier analysis of other project types that can be met without new analysis (e.g., documentation of the use of government or GEF funds to provide incentives for such types of projects or programmes in order to indicate additionality; market research demonstrating that the project technology has a higher up-front capital cost than the baseline technology; official documents showing that the technology to be used in the project activity is more efficient than a mandatory standard, voluntary label or other widely used benchmark level in order to demonstrate additionality).

The CDM Executive Board should prepare with expert input a dedicated tool to demonstrate the additionality of end-use efficiency projects or programmes using barrier analysis for integration into large-scale methodologies. This tool would have to adopt the basic premise that barriers to end-use efficiency exist, as is well documented and evidenced by the fact that investments in end-use efficiency are not being made, despite their short payback periods

Besides the challenge of demonstrating additionality, the greatest barrier to mobilizing

21 New results from government-funded audits in hundreds of US industrial installations have uncovered large energy-saving potential, with the vast majority having payback periods of less than two years: www.eere.energy.gov/industry/saveenergynow/partners/results.cfm

carbon finance for end-use efficiency under the CDM has been a lack of viable approved methodologies for quantifying energy savings and emission reductions, as discussed above. Reform suggestions that draw on experience with end-use energy efficiency promotion efforts worldwide address: (i) the role of the CDM Executive Board; (ii) the interpretation of key CDM concepts; and (iii) the new methodology development process.

The role of the Executive Board as a regulator of the CDM is crucial. Yet the Board's role in providing top-down evaluation guidance is not well defined. In the case of small-scale projects, the Board issued an initial series of simplified methodologies for use and has added new methodologies over time, based on suggestions from external stakeholders. In the case of large-scale methodologies, the Board offers consolidated methodologies based on individual methodologies developed by stakeholders, but does not offer new methodologies itself.

Table 3. Description of Selected California Evaluation Protocols

Protocol	Description
Impact Evaluation – Direct and Indirect	Minimum allowable methods to meet a specified level of rigour that will be used to measure and document the programme or programme component impacts achieved as a result of implementing energy efficiency programmes and programme portfolios. Impact evaluations estimate net changes in electricity usage, electricity demand, therm usage and/or behavioural impacts that are expected to produce changes in energy use and demand. Impact evaluations are limited to addressing the direct or indirect energy impacts of the programme on participants, including participant spill-over impacts.
Market Effects Evaluation	Guidance on evaluations conducted to document the various market changes that affect the way energy is used within a market and to estimate the energy and demand savings associated with those changes that are induced by sets of programme or portfolio interventions in a market.
Codes and Standards Program Evaluation	Designed to guide evaluation approaches to meet the specific needs for codes and standards programmes, including net energy impacts associated with a code or standard change.
Measurement and Verification	Requirements for field measurements and data collection to support impact evaluations, updates to ex-ante measure savings estimates (deemed) and process evaluations. Note that not every evaluation study requires M&V.
Sampling and Uncertainty	Approaches for selecting samples and conducting research design and analysis in order to identify, mitigate and minimize bias in support of the Protocols identified above.
Effective Useful Life	Approaches for establishing the effective useful life of programme measures (including evaluation of measure retention and technical degradation of measure performance).

Source: CPUC (2006)

The Board also issues piecemeal guidance on individual topics, but has never issued a comprehensive evaluation protocol that would provide guidance to project participants, DOEs, their own panels and UNFCCC secretariat staff.

Particularly in the field of energy efficiency, there is a wealth of information to draw on in establishing such evaluation frameworks (Arquit Niederberger, 2007). The California Public Utility Commission, for example, has issued the "California Energy Efficiency Evaluation Protocols" (CPUC, 2006), which includes separate detailed protocols that could inform the CDM regulatory framework (Table 3).

Relying on such protocols as a starting point also offers some suggestions for how to realize the new CDM vision presented above. Adopting and/or updating building codes and minimum energy performance standards, for example, is one important action that developing countries can take to contribute to the ultimate objective of the Convention, yet the CDM Executive Board has ruled that such regulatory efforts are not eligible under the CDM. In contrast, the CPUC Codes & Standards Protocol offers a methodology to estimate gross and net energy savings for both (i) programmes that change or contribute to a change in building codes or appliance standards that are expected to result in energy savings, and (ii) programmes that are implemented to increase the level of compliance with code requirements. Similarly, the COP/MOP or CDM Executive Board could decide to undertake market impacts analyses periodically to investigate whether the CDM is only a zero sum game, making Annex I compliance more cost-effective, or whether CDM project activities are driving broader market transformation impacts in host countries that cannot be evaluated at the level of an individual project. These protocols also address various cross-cutting issues that are particularly pertinent to end-use efficiency efforts (e.g., measurement and verification requirements; determination of free ridership and positive spillovers; determination of standard values for parameters such as effective useful life, deemed energy savings and net-to-gross of free ridership values) in a consistent, top-down fashion, which is sorely lacking under the CDM. However, it is clear that striving to adopt such an evaluation framework will necessitate changes in the division of labour between the Parties to the Kyoto Protocol, the CDM Executive Board (and its panels), the DOEs, and the project participants.

Another advantage of adopting a more "top-down" approach would be greater coherence in the interpretation of key CDM concepts (e.g., additionality, leakage, treatment of policies and measures in the baseline scenario) by the various entities active in the carbon market, including the panels and working groups appointed by the Executive Board.

Finally, it is necessary to consider the best way forward in developing new quantification methodologies for end-use efficiency projects. The results of the vast efforts that have been invested in methodology development are meagre, with only a total of eighteen energy-demand (sectoral scope 3) projects having been registered to date (Table 2). The majority of the approved energy-demand methodologies have never been used, and the small-scale Type II end-use efficiency methodologies have prove difficult to apply in practice, as they provide too little guidance. It is time to take stock and conclude that the bottom up approach has not worked – and is not desirable – for end-use energy efficiency, and that a common methodological framework for energy efficiency quantification is needed. The development of

such a framework should draw on the vast expertise within the energy efficiency community, for example, by adopting energy savings quantification "good practice" as codified in existing protocols, adapted as necessary to meet the requirements of the CDM. This should be treated as a priority of the CDM Executive Board, but coordinated with the broader effort of developing methodological guidance on quantification and reporting on the effects of measures, which is currently negotiated under the AWG-LCA. COP14 should initiate the process of developing consistent guidance.

Conclusion

The Clean Development Mechanism has proved ineffective in stimulating investment in end-use energy efficiency. This will come as no surprise to energy efficiency practitioners, who understand that large-scale market transformation requires a multi-pronged approach, but it is nonetheless a disappointment to many developing countries that could benefit greatly from CDM funding for large-scale energy efficiency programs to distribute efficient end-use equipment, for example, or implement green building codes and minimum energy-performance standards.

Fortunately, the Bali Roadmap process presents us with a brief window of opportunity to ensure that the climate deal to be brokered in Copenhagen in December 2009 provides the foundation for a global energy-efficiency offensive, with the CDM as one tool. But there is a lot of work to be done to anchor the vision presented in this paper in the post-2012 framework.

For the CDM to achieve its dual mitigation and sustainable development objectives, the Parties can no longer be satisfied with perfect environmental integrity of a zero-sum CDM at the expense of real action on end-use efficiency. The desire to monitor, quantify and attribute the impacts of individual CDM projects precisely and accurately will be increasingly futile, given the range of regulatory, institutional, technology, financial and capacity development efforts that will be required. This is particularly true in the context of climate mitigation, which must deliver transformational emission cuts globally within decades. The CDM should be regarded as a risk/reward incentive mechanism to stimulate greater investment in climate mitigation and sustainable development, not as an accounting tool for perfect offsetting.

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References

Arquit Niederberger, A., *Advancing Energy Efficiency Under the Bali Action Plan*. UNFCCC submission in response to the call for input from accredited observer organizations included in FCCC/AWGLCA/2008/L.7, September 2008.

Arquit Niederberger, A., *Energy Efficiency Projects in CDM*. Seminar Issue Paper, UNIDO/CTI/UK Trade & Investment Seminar on Energy Efficiency Projects in CDM and JI, Vienna, 19-20 March 2007.

Arquit Niederberger, A., MDG Carbon Finance Action Plans: Leveraging New Markets for Sustainable Development, *CDM Investment Newsletter*, 1/2006, 3-6, 2006.

Arquit Niederberger, A., and C. Brunner, Promotion of High-Efficiency Electric Motor Systems Under the Clean Development Mechanism, Conference Proceedings, 5th International Conference on Energy Efficiency in Motor Driven Systems. Beijing, 2007.

Arquit Niederberger, A., and T. Fry, An Eye on Demand, *Environmental Finance*, Special Supplement, S52, November 2007.

Arquit Niederberger, A., and R. Spalding-Fecher, Demand-side energy efficiency promotion under the Clean Development Mechanism: lessons learned and future prospects, *Energy for Sustainable Development*, X(4), 45-58, December 2006.

CDM-EB, *Report of the Thirty-Second Meeting of the CDM Executive Board*, Annex 6. CDM-EB-32, 22 June 2007.

CDM-EB, *Report of the Twenty-Second Meeting of the CDM Executive Board*, Annex 3. CDM-EB-22, 25 November 2005.

CPUC, *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*. California Public Utility Commission, April 2006.

EGEE, *Realizing the Potential of Energy Efficiency – Targets, Policies and Measures for G8 Countries*. United Nations Foundation, Washington, July 2007.

GOC, *China's National Climate Change Programme*. National Development and Reform Commission, Government of China, 3 June 2008, 62 pp.

GOI, *National Action Plan on Climate Change*. Prime Minister's Council on Climate Change, Government of India, 30 June 2008, 49 pp.

Hinostroza, M., Cheng, C.-C., Zhu, X., Fenhann, J., Figueres, C., and F. Avendaño, Potentials and Barriers for End-Use Energy Efficiency under Programmatic CDM, UNEP Riso *CD4CDM Working Paper Series*, 3, September 2007.

IEA, *Energy Efficiency Policy Recommendations*. Paris: International Energy Agency, 2008.

IIEC, *Final Evaluation of CFL Program (Phases 1 & 2)*. Report prepared by the International Institute for Energy Conservation (IIEC) – Asia for Electricity of Vietnam in the context of the Vietnam Demand Side Management and Energy Efficiency (DSM/EE) Project, April 2007.

Reddy, B.S., and P. Balachandra, Climate change mitigation and business opportunities: the case of the household sector in India, *Energy for Sustainable Development*, X(4), 59-73, December 2006.

Shukla, P.R., Climate Change Divide, *Sakaal Times ePaper*, 6 August 2008.

Takada, M. and S. Fracchia, *A Review of Energy in National MDG Reports*. UN Development Program, January 2007.

UNEP Risø CDM Pipeline, *1 September 2008*

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SECTOR NO-LOSE TARGETS:

A New Scaling Up Mechanism For Developing Countries

Abstract

Sector no-lose targets (SNLTs) are a promising new carbon-market mechanism for scaling up investment in low-carbon technology in developing countries. A key characteristic of SNLTs is that, because they would be negotiated as part of the multilateral agreement along with industrialised countries' targets, the concept of additionality would not apply, nor would any of the institutional processes of the CDM. Countries would need to have well-developed national monitoring, reporting and verification (MRV) and systems at the sector level. SNLTs are not a scaling up silver bullet, but they have some characteristics which suggest that, for some sectors in key developing countries where large investments are expected in the coming decades, they may be the best new carbon-finance mechanism identified thus far.

Whether expressed in gigatonnes of needed emission reductions or tens to hundreds of gigadollars of needed investment in climate change mitigation activities worldwide, the case for "scaling up" has been made by world scientific, political and business leaders. The task of policy-makers working on the next post-2012 multilateral agreement is to respond to this challenge and consider seriously every policy instrument that may need to be part of the toolkit to give the global community a reasonable chance of success. Just making tuning adjustments to the instruments we have now is not nearly enough.

Sector no-lose targets (*SNLTs*) for developing countries is one such new mechanism. It is a crediting mechanism that can be applied at the sectoral level, at least for some sectors and countries. It has the potential to make it much easier to mobilise the necessary inward investment and also to help strike a balance between the interests of developed and industrialised country parties to such investment.

However, *SNLTs* come with some unique challenges, for example: data needs to establish sector baselines at a national level; MRV capacity needs; understanding the effects on international competitiveness; institutional process and timing issues; and ensuring carbon market engagement and momentum. Overcoming even the initial set of these will require very substantial and deliberate capacity-building and international diplomacy efforts if countries are ever to be prepared to reach such agreements in the post-2012 multilateral package.

These issues and challenges are set out and discussed below. This is done with a view to giving negotiators a sense of priority next steps to programme into work streams leading to Copenhagen.

Background

This new proposed mechanism of *SNLTs* can be seen to have emerged from two different strands of policy work. The first is the exploration in various forums of new potential types of enhanced policy tools that might be applicable for developing countries in a post-2012 agreement.

In particular, the *Future Actions Dialogue* run by the Centre for Clean Air Policy (CCAP) since 2003 came to a view after a few years that sectoral mechanisms held out the greatest promise, especially if they were framed in intensity terms. This is because economy-wide targets, even intensity-based ones, seem to go beyond the realms of reasonable expectation in this next phase of global climate change agreements. Moreover, economy-wide targets can have practical structural difficulties such as the double pain problem, where targets are expressed in emissions per GDP.[1] But intensity-based sectoral mechanisms would not suffer this problem.

In addition to the CCAP work, there has been considerable analytical effort done on sectoral crediting mechanisms by the Annex I Experts Group, supported by its secretariat experts at the OECD and the International Energy Agency (IEA) (e.g. see Baron et al., 2007; Baron and Ellis, 2006; Ellis and Baron, 2005).

The second strand has come out of the high-level work on *scaling up* investments in low-carbon technologies, which has mostly been led by the G8 Gleneagles Dialogue process, also involving the World Bank and IEA. Recent papers for UK DEFRA (Ward et al., 2008) and the World Bank Carbon Finance Unit (Ward, Garibaldi et al., 2008) pull these two strands together, as well as placing *SNLTs* in the broader context of other *scaling up* mechanisms, such as programmatic and sectoral CDM, and other sectoral policy approaches for developing countries, such as SD PAMs.

Papers (Colombier and Guerin, 2008 and Ward, 2008) from the recent Tony Blair and Climate Group *Breaking the Climate Deadlock* initiative have also sought to place sectoral crediting mechanisms such as *SNLTs* within the broader spectrum of *sectoral approaches*, including sectoral agreements that can bridge industrialised and developing countries.

This paper draws on this earlier body of work and seeks to summarise and distil some key messages about *SNLTs* in particular.

1 Here, countries could find themselves struggling to meet targets if their GDP fell (e.g. for macroeconomic and global commodity price reasons) without a commensurate drop in domestic emissions.

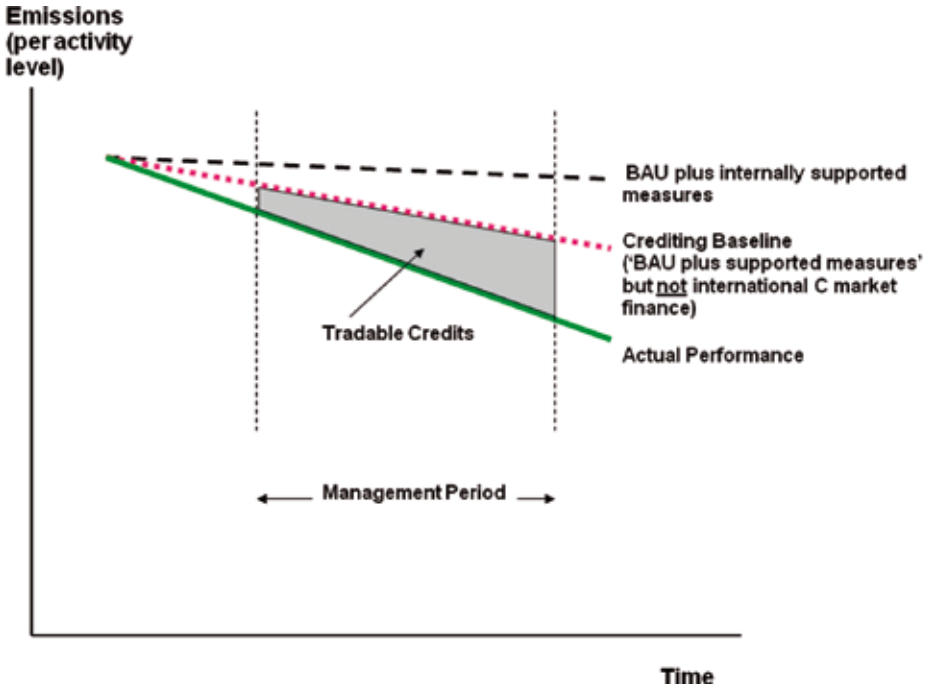
The SNLT policy tool

SNLTs are a form of non-binding emission target that could encourage sector-wide emission reductions. Developing countries could voluntarily propose a sector crediting baseline which would be negotiated at the international level, most likely in terms of the national emissions intensity of the sector in question over a commitment or management period of time. Reductions below the baseline generate credits issued to the government, *but no penalties would occur* (hence "no lose") if the target is not met for the whole sector. See Figure 1.

What is depicted in Figure 1 could also describe what has been called "sectoral CDM" where some form of baseline is established for a sector e.g. a multi-project baseline or benchmark and credits are awarded for beating this baseline. The main difference between sectoral CDM and *SNLTs* is that the technicalities referring to baselines, monitoring and verification, as well as supervision and approval by the CDM Executive Board, would be maintained under sectoral CDM. Proponents of the *SNLT* mechanism propose that the national sector baseline for a *SNLT* would instead be negotiated at the COP level. This would be done as part of the same negotiating process in which Annex I country targets for post-2012 are being agreed, so additionality would no longer be an issue, any more than it is for actions taken by Annex I countries that have targets.

This *additionality* distinction between *SNLTs* and any form of CDM is what distinguishes this policy

Figure 1: Simple depiction of a sectoral crediting baseline



Source Ecofys/GtripleC (2006)

tool in particular, suggesting that it might have the greatest potential for scaling up investments, at least in appropriate sectors. The single main reason for constraints in the CDM is the institutional decision-making processes associated with additionality and environmental integrity.

As noted above, the idea for *SNLTs* stems from discussions occurring as far back as 2003 in the CCAP *Future Actions Dialogue*. Two variants of this idea have now emerged, largely independently of each other. Of the two, the CCAP approach (see Schmidt et al, 2006) can be seen as a more prescriptive version and one with elements that are specifically intended to address international competitiveness concerns. The CCAP approach would focus on the ten largest developing-country emitters for each of the major sectors proposed e.g. electricity, iron and steel, chemical and petrochemical, aluminium, cement and limestone, paper pulp and printing. A technology and financing package would be provided to these countries to offset the costs of their involvement. These costs stem from the requirement for crediting baselines to incorporate a non-crediting element that represents these countries' contribution to the atmosphere. The competitiveness-focused elements relate to the use of pre-set benchmarks established by third-party independent-expert bodies. These benchmarks provide the starting point for negotiations with developing countries on what their specific crediting baselines should be. The benchmarks are also intended to guide allocations for industries in these sectors operating in the EU ETS, and presumably other industrialised countries as well.

The other variant of the *SNLT* idea, developed by GtripleC and Ecofys, has centred on the development of sectoral proposal templates (see www.sectoral.org). The purpose of these templates – which could be used by any developing country seeking to propose such a target voluntarily as part of the post-2012 negotiations – is to provide a standardised tool by which countries can draw up and propose crediting baselines. These templates are initially seen as a capacity-building tool for countries to use internally. In turn, they become a negotiation facilitation tool to help the process of negotiations by providing some level of standardisation of information, presentation and transparency. The templates include details of best practice as this exists in other countries, not with a view to these being seen as benchmarks and used as the basis for negotiations. And instead of the notion of having a negotiated technology and finance package, the templates describe what internationally provided support countries may be receiving in a given sector (or might receive in the future) that can allow them to achieve lower emissions separate from the support of carbon finance.

These summary differences aside, both concepts share the characteristics of voluntarily proposed targets being intended for developing countries. The metric for these targets will most likely be set in intensity terms, e.g. tonnes CO_2 per tonne of cement or per MWh electricity. This distinguishes these concepts from so-called 'transnational sectoral targets', i.e. industry sectoral targets, where the aim would be targets (or benchmarks) for industries operating in both industrialised and developing countries.

While the CCAP proposal does have an element of this competitiveness-focused thinking in its use of international benchmarks, as it applies to developing countries, it is clearly in the same family of ideas as the GtripleC/Ecofys variant. In particular, where this paper focuses on domestic implementation issues, these should generally apply to either variant of the concept.

SNLT candidate sectors

It can be expected that developing countries may be stimulated to consider *SNLTs* in sectors for which they seek significantly scaled-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.

However, *SNLTs* are unlikely to be feasible for all key sectors, and even for those sectors where they may be feasible, this may not be true in all developing countries. Like all credit-based mechanisms, it is necessary with *SNLTs* to establish a baseline, and then measure, report and verify performance against this.

The metric of this baseline, then, must be something that is measurable in practice and where a measured change is representative of either reduced tonnes of emissions to the atmosphere, or enhanced sequestration. This becomes increasingly challenging as one moves away from project-scale CDM projects towards something at the sector level. Moreover, given that the the *SNLT* tool is used in developing countries, the performance metric is typically framed in intensity[2] terms to ensure that it does not operate as a cap on development. Having intensity baselines also means the need for the parameter that is the denominator in the metric to be measurable and, in turn, measured, reported and verified.

Some examples of possible sectors and baseline metrics are:

- electricity generation: tonnes CO_2e per MWh generated. Note also that this would represent tonnes of emissions emitted into the atmosphere, so reductions from carbon capture and storage (CCS) would be picked up under this metric. It might also be feasible to do a separate sector baseline for resultant emissions associated with electricity losses in transmission and distribution systems.

Sectoral no-lose targets (SNLTs) are particularly appropriate for rapidly industrialising (or developing) countries where there is a need for significant capital investment, and where investments are otherwise likely to follow historical high-carbon patterns typical of industrialised countries.

- cement, aluminium or steel production: tonnes CO_2e per tonne produced. Some similar industrial commodities may also be feasible, e.g. bricks, pulp and paper, some chemicals, including refined oil products, and some mining and mineral processing.

- upstream emissions of oil and gas production (e.g. gas flaring): tonnes CO_2e per barrel of oil delivered to refineries or export facilities, or volume of gas delivered.

Notably, most of these examples are industrial in nature and probably reflect smaller numbers of large sources. By comparison, sectors such as buildings and transport have large numbers of small sources. A *SNLT* approach here is

2 At the end of a given management period, when the performance of the denominator parameter is known, intensity targets can be converted into absolute tonnes and compared with tonnes of emissions, thus enabling credits to be issued in 'tonnes'.

much more complex and perhaps not feasible – although it may be possible to define some sub-sectors, including perhaps regions of sub-sectors that are sub-national in scale.

SNLT candidate countries

As discussed above, the CCAP variant of *SNLTs* proposes a focus on the top ten emitters among developing countries for given key sectors. In contrast, the Ecofys/GtripleC approach takes the perspective that *SNLTs* should be open to any developing country that wishes to propose *SNLTs* voluntarily and that can develop the requisite measurement, reporting and verification (MRV) national systems capacities.

More generally, the key issue is *scaling up* the investment in low-carbon technology in key investments, especially in new infrastructure investments, but also in upgrades of existing capital stock. This suggests that *SNLTs* are particularly appropriate for rapidly industrialising (or developing) countries where there is a need for significant capital investment, and where investments are otherwise likely to follow historical high-carbon patterns typical of industrialised countries. The *Energy Investments Outlook* work of the IEA provides a useful information base that describes in which countries such major investments in low-carbon technology are likely to be needed.

In some cases, the nature of the sector provides insights into which countries might benefit most. So, for example, an *SNLT* for upstream oil and gas processing focusing especially on gas flaring may be particularly relevant to countries such as Indonesia and Nigeria. Similarly, an *SNLT* for electricity transmission and distribution may be particularly relevant to India.

Finally, there is a big picture politics to this. Section 9 below takes up the issue of the need of a demand for the *scaled up* supply of credits that *SNLTs* imply. This demand will only come from the much deeper absolute and economy-wide emission-reduction targets that are expected of industrialised countries in the post-2012 agreement. However, for these countries to take on and ratify such targets, it is likely that there is a strong domestic political need for major developing countries to take on targets of some type too, especially in some key sectors such as electricity generation.

Fit with other policy tools

SNLTs can be seen as one of a menu of possible international policy tools for developing countries that provide some kind of incentive. As noted above, *SNLTs* are seen as being potentially applicable to some key sectors in some developing countries. Other carbon-finance policy tools include the family of possible variants of the CDM mechanism (standard project-based, programmatic, policy-based, sectoral). Non-carbon finance policies include, for example, SD-PAMs and specific sectoral agreements, with for both of these some form of technology and/or financial support.

In general, if a country implements an *SNLT* in a given sector, this sector is no longer eligible for new CDM activities, as this would potentially lead to double crediting. However, a form of JI-like mechanism could be employed domestically to nest project-based carbon financing within such a sector. This is taken up below in section 8.

Conceptually, there is no problem in having a mix of an *SNLT* and SD-PAMs and other forms of non-carbon finance policies occurring in the

same sector. These other policies can be seen as being part of the discussions about the baseline beyond which carbon finance under an *SNLT* applies. This is depicted below in Figure 2 in section 7.

Major steps to include SNLTs in the post-2012 agreement

High-level issues

A series of steps are needed at both the national level of interested developing countries and the international intergovernmental level. In the interests of time, and given that this new policy tool is being proposed as potentially a key new mechanism in the post-2012 period, it will be important that the national and international steps proceed in parallel – and expeditiously!

It is important not to impose a set of expectations on developing countries beyond what is expected of industrialised countries, especially where infringements on sovereign rights and responsibilities may be perceived. *SNLTs* need to be seen in the context of targets voluntarily taken on in a multilateral negotiation process, as distinct from baselines of the CDM type. To this extent, *SNLTs* are not unlike the targets that will be taken on by industrialised countries, although there are some key technical differences.[3] But in both cases, the beating of a target has the result of creating tradable emission units called credits in the case of *SNLTs*, and Assigned Amount Units (AAUs) in the case of industrialised country targets. In either case, for example, excessively soft targets have the potential to be a source of excessive supply to the carbon market and undermine its effectiveness for all countries.

3 In particular, SNLTs are expected to be defined in intensity terms, meaning that credits are issued ex-post following verified performance over a given period.

Any differences in the treatment of prospective targets for industrialised countries and *SNLTs* for developing countries therefore need to be grounded in an objective realisation of facts. A key issue here is the different capacities and capabilities relating to MRV systems. Industrialised countries have had nearly ten years to prepare for the Kyoto Protocol's first commitment period, whereas for developing countries MRV has mostly just been focused at the project level, when CDM activities were undertaken.

One issue that seems to need the serious and immediate attention of the international community is how the post-2012 negotiations are going to cope with the need for objective and accurate data and analysis of countries' national circumstances, including proposals that are transparent and accessible to all key players in the negotiations. Significant targeted capacity-building is likely to be needed.

A key characteristic of SNLTs is that, because they would be negotiated as part of the multilateral agreement along with industrialised countries' targets, the concept of additionality would not apply, nor would any of the institutional processes of the CDM.

Under the CDM, the Conference of the Parties (COP) delegated the responsibility for accepting baselines to the CDM Executive Board (EB). In turn, the EB relies heavily on the technical expertise it can draw on from its various panels and working groups. Also, the accredited designated operational entities (DOEs) have a critical role to play in the overall quality assurance of EB

decisions about baselines. Another key point is that, in the CDM, possible errors in judgement are contained at the project scale.

Agreeing *SNLT* baselines at the COP level is a much more significant step. This raises key institutional questions with respect to the process of how Parties reach the necessary level of confidence in their understanding of the consequences of their impending decisions to be able to reach final agreements. It seems that there is a need for an objective technical advisory group to assist the negotiation process of *SNLTs*, and perhaps even of industrialised countries' targets. Its advice should be transparent and available to all Parties.

The COP may also see the value of establishing some kind of executive board or group to manage this technical process and bring recommendations to the COP. In some ways, such an executive group would play a similar role to the CDM EB. However, this group would have a purpose-specific and time-limited function. And on the issue of time, it would need to be established very quickly and efficiently, e.g. in the first half of 2009. Unfortunately, the history of the UNFCCC being able to create such an institutional group very quickly and efficiently does not inspire much confidence. But the UNFCCC process itself needs to be ready to up its game in order to manage the challenges presented by the post-2012 negotiations.

National level steps

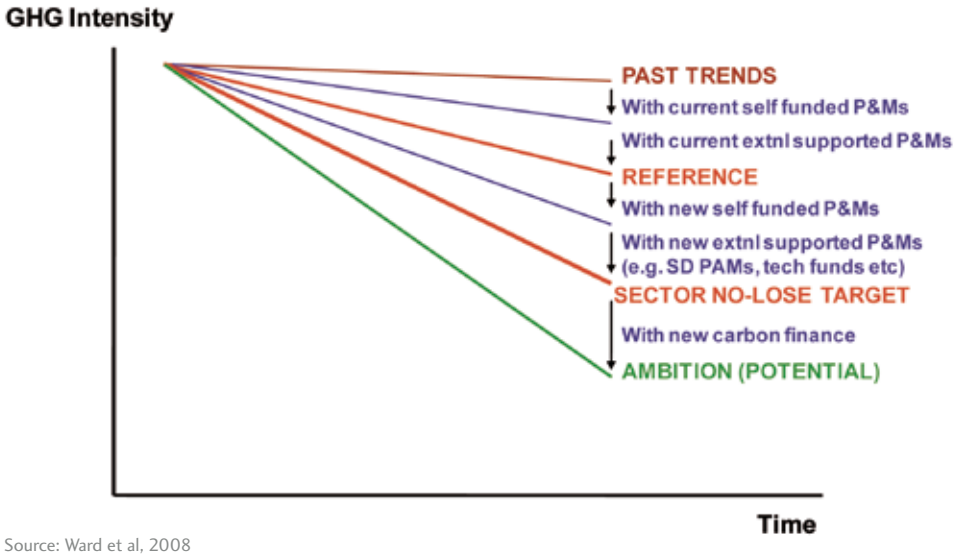
A first step to generate national interest and begin the preparation of information and data is to raise awareness of the existence of the *SNLTs* policy tool at the national level. This should be done at various levels of the government, and also within the industry in a given sector (or sectors) of a given country that might be suitable for this approach. Initiatives have to be taken to inform stakeholders by, for example, organising workshops around the subject so that institutions can take ownership of the technical exercises that will come.

Once the basics of the approach have been understood, it will become clearer whether general interest exists and an initial understanding of the capacities in a given country can be acquired. In thinking about their scaling-up priorities, developing countries will need to decide which sectors or technologies are most effectively addressed by a *SNLT*, and which sectors might be more effectively dealt with by, for example, programmatic CDM or other funding mechanisms. These are issues which, by their nature, fit well under the concept of developing countries taking a strategic *programme approach* to securing low-carbon investment.

Within this initial familiarisation process, an assessment should be made of which sectors in a given country might be relevant for *SNLTs*. As noted in section 4, a key consideration is likely to be sectors that have large and growing emissions, where there is a need for significant investment in low-carbon technologies and where such decisions have significant long-term emission consequences. These investments might be either for the modernisation of existing or for new infrastructure and plant. It is also likely to depend on the maturity of the sector, which in turn depends on data availability and capacities, among other factors.

For given sectors, countries then need to begin the process of determining what an appropriate baseline might be for the *SNLT*. Ecofys/GtripleC's work on sectoral proposal templates, noted in section 3, is specifically intended to help at this stage. The templates assist a country to prepare

Figure 2: Development of SNLTs



Source: Ward et al, 2008

and, in turn, tell its story in terms of the potential for improvements in GHG intensity for the given sector, following the steps depicted below in Figure 2.

The in-country efforts described above in this section involve a significant commitment of resources and time. A financing package is likely to be needed for many developing countries to undertake the necessary in-county work to get them to the point of being ready to present proposals for *SNLTs* in the negotiations of the multilateral post-2012 climate agreement.

Issues arising for the negotiation process

Multilateral negotiations by their nature reflect the interests of all countries, both in broad groups and individually. Negotiations under the UNFCCC in particular also reflect a general consensus-based process. Taking up a new mechanism such as *SNLTs* therefore requires a general consensus that this is useful to achieving an overall agreement.

The key feature of *SNLTs* is that they move beyond the institutional constraints that will exist for any carbon market mechanism where additionality is a core requirement. Moreover, for such sectors and countries, it shifts the focus of climate-change mitigation to a sector level and requires management across whole sectors, not just individual projects or activities.

The potential benefit of scaled-up, carbon market-financed investment for developing countries seems clear. A crucial question is whether industrialised countries feel that the increased scope for least-cost mitigation, plus mitigation management at the sector level by developing countries, provides what they are expecting of such sectors in developing countries in the post-2012 regime.

A key underlying issue here is the international competitiveness of emissions-intensive sectors in industrialised countries – specifically carbon leakage. Between industrialised countries this

concern mostly is displayed through an expectation that all industrialised countries will take fixed and binding economy-wide targets. The debate is, then, how stringent the reduction targets of individual countries should be. Of course, within industrialised countries there will be domestic policy debates about how such national targets are then distributed among specific sectors, especially those perceived to be internationally competitiveness-at-risk. But this is largely a domestic policy matter that need not be addressed by the international community.

With respect to *SNLTs* for developing countries, the form the competitiveness issue takes is different. It becomes a question of whether industrialised countries, under pressure from their domestic industry constituencies, have specific technical requirements for such *SNLTs*. These, for example, may indicate an expectation that some sectors in some countries should be covered in such a regime, or that certain technical benchmarks should be applied in the determination of appropriate baselines. This can be seen as lying behind the CCAP sectors and top ten-country proposals and their use of agreed international benchmarks as the starting point for the negotiation of *SNLTs*.

It is clear that there is traction in some emissions-intensive industry sectors in industrialised countries that such competitiveness concerns should be given serious consideration in any formulation of a new *SNLTs* mechanism, or for that matter, in the formulation of any developing country commitment. Indeed, there is a view in some quarters that global industry agreements in certain competitiveness-prone sectors, such as cement, iron and steel and aluminium, covering both industrialised and developing countries are preferable to having these sectors covered by *SNLTs* in developing countries. What is less clear is whether these competitiveness concerns have sufficient traction with enough industrialised country governments for this to have an impact on the development of negotiation modalities for *SNLTs*.

In addition to competitiveness concerns, there may be concerns about the scale of credits that may flow from some sectors if sectoral crediting were allowed. This issue concerns the potential mismatch of demand and supply in the carbon market (i.e. potentially too little demand and too much supply).

If these competitiveness and potential (over-supply concerns become sufficiently important to major players in the negotiations, then the following type of decision might be deemed necessary with respect to the development and negotiation of proposals for *SNLTs*:

- which sectors are suitable on the national and international level (and which are not), including the technical or other criteria by which these judgements might be made

- the demarcations of the sectors in order to provide for international comparability; while for some sectors boundaries are relatively easy to define (e.g. the cement sector), this might be more challenging for others (e.g. chemical production). Spill-over effects have to be accounted for.

- what data and information must be provided, and the nature and uniformity of this data (e.g. for comparability assessments).

It may be desirable to collect data centrally

that is comparable across countries. These data could help countries that are proposing national sectoral baselines and other countries and institutions to judge the stringency of the proposed baselines.

Irrespective of whether these issues become a necessary part of the process of negotiations for *SNLTs*, it can be expected that there will be requirements for a minimum level of sophistication and performance of MRV systems for any such sectors. This may have the effect of ruling out some sectors in some countries where the MRV systems are not sufficiently mature.

Attention to MRV issues is therefore a critical issue in the national level development and testing of the *SNLT* mechanism. Challenges that might be faced in this process could include the availability of data from industry for reasons such as competitiveness concerns, especially confidentiality, or institutional barriers within the industry. Furthermore, the time frame within which this has to be achieved could be difficult to set, as the amount of data that needs to be gathered might differ tremendously from country to country, not only because of the size of each country's sector, but also because of institutional and political barriers, which might be quite different across countries.

A key point regarding the issues raised above is that those groups that are already working proactively on methodologies applicable to this mechanism (e.g. sectoral proposal templates) need to obtain some indications as soon as possible from the international community as to the likely required technical specifications for the information and data needed to support the negotiations. This will help such groups testing the viability of this mechanism in given countries and sectors in their ongoing work.

A significant issue for the negotiations that is relevant to *SNLTs* in particular is that it cannot be expected that every developing country that may be interested in proposing *SNLTs* will be ready to do so at the time that the international community expects the main details of the post-2012 multilateral climate-change deal to be agreed (e.g. in late 2009). This suggests that a doorway mechanism of some sort needs to be part of the main agreement, leaving open the option of such *SNLTs* to be added to the agreement at a later stage.

SNLTs can be seen as one of a menu of possible international policy tools for developing countries that provide some kind of incentive.

More work is needed on this timing mismatch issue, including the issue of how subsequent agreement on SNLTs may affect the targets that have already been agreed for industrialised countries. The best option seems to be for the immediate implementation of accelerated capacity-building and diplomatic effort, such that details of potential *SNLTs* in some key sectors in some key countries can be well advanced by the time that industrialised countries are agreeing their next targets. The *SNLT* agreements could then be finalised in the period between industrialised countries agreeing their targets and the overall package of the deal being ratified by domestic governments.

Given the potential importance of the *SNLT* mechanism, it will be desirable to find some early means to pilot test it prior to the final details of the mechanism being set. Countries that have sectors mature enough for no-lose targets could volunteer to participate. The World Bank's new

Carbon Partnership Facility (CPF) provides an opportunity for such piloting. It is conceivable that pilot-phase activities could be carried out for some sectors at either the national or sub-national regional levels. A number of the proposed possible pilot initiatives identified by the World Bank for the CPF, in particular large-scale renewable electricity generation, could be seen as amenable to a *SNLT*-type mechanism.

Implications for domestic policy and private-sector carbon finance

A key issue for developing countries with *SNLTs* is how the interest of project developers and carbon financiers, whose activities thus far under the CDM have focused at the project level – including, importantly, the issuance of carbon credits – can be maintained when crediting occurs at a sector level and, in the first instance, is directed to governments.

SNLT has the potential to make it much easier to mobilise the necessary inward investment and also to help strike a balance between the interests of developed and industrialised country parties to such investment.

To achieve sectoral emissions reductions, national governments could implement domestic policies and measures with direct links for entities to the international carbon market, e.g. schemes that allocate credits to emissions-reduction activities by entities in the relevant sector, or by establishing internal emissions trading schemes like the EU ETS;

Governments could also implement new and additional domestic policies or enhance the enforcement of existing measures that do not rely on carbon finance and emissions trading. Carbon taxes, enhanced law enforcement, intensity or efficiency standards, and subsidies (either adding or removing subsidies as the case may be for a particular sector) are examples of these types of policies and measures. Governments can then sell the received credits directly on the international carbon markets.

To overcome the potential problem of the disengagement of currently active carbon market players (project developers and carbon financiers) because of concerns about having to negotiate with national governments to obtain credits, a *nesting approach* could be employed whereby an international institutional process akin to the current CDM, or 'Track 2' JI existed and credited individual on-the-ground activities. The total of any credits issued under this process would then be deducted from the amount the country was later issued for the overall sector performance.

If a concern arises that there may be a demand–supply imbalance that would harm the carbon market (i.e. too little demand and too much supply from sectoral crediting in developing countries), a variant of the nesting approach may be to have funds provided to governments for beating their sector targets, not carbon credits.

Significant institutional issues regarding capacity, legal frameworks and public compared with private can arise with all domestic implementation models.[4] Given these institutional issues, there are substantial capacity-building challenges that need to be taken up with some urgency if *SNLTs*

4 These are assessed in some detail in Ward et al., 2008.

are going to play a significant role in the next multilateral framework.

Scaled-up supply needs scaled-up demand

The case has been made in a range of studies for the need for the scaling-up of investments. Moreover, there seems to be an expectation that the private sector, and the carbon market specifically, will play *a*, if not *the* major role in providing this investment. But where is the market demand to come from? Discussions about enhanced mechanisms serving the supply side such as *SNLTs* will be affected if there is no compelling answer to this question.

There are reasons for concern. Thus far, the primary demand driver of the market for CERs has been the EU ETS. The EU Commission's 23 January 2008 proposal for amendment of the ETS Directive does not provide any demand for imports from new CDM projects starting after 2012 in the absence of an international agreement. Then there is the issue of the supply of credits potentially coming from the renewal of existing CDM projects. Project activities registered for seven years can request renewal for a second and third crediting period. This means that current CDM projects registered for seven years could effectively have a 21-year life-cycle if renewal does not change the baseline for these projects. For the period 2013-2020, *if* there is a renewal of *all* projects beyond their first crediting period, there is a potential supply of CERs from projects that have already been implemented or in the pipeline of about 4.8 billion CERs[5], thus significantly limiting the incentive for new investment.

5 Source: J. Fenhann, UNEP Risoe.

Summarising, then, for there to be significant new demand for compliance carbon commensurate with expectations on the supply side, in addition to this renewal issue needing to be addressed, industrialised countries (and not just the EU) will need to take on significant emissions-reduction obligations in the post-2012 climate deal.

This demand–supply balance issue can be expected to lead to a growing awareness that mechanisms that may flood the market with large numbers of compliance credits may not be good for the overall health of the carbon market. This suggests that close attention will continue to be paid to baselines, whether these are part of CDM-based mechanisms or of the form of *SNLTs*.

Concluding comments

SNLTs are not a scaling-up silver bullet, but they have some characteristics which suggest that, for some sectors in key developing countries where very large investments are expected in the coming decades, they may be the best new carbon-finance mechanism identified thus far.

Moreover, in conjunction with SD-PAMs, they may be what are needed to strike the appropriate political balance with respect to mitigation between industrialised and developing countries in the post-2012 agreement. To obtain a post-2012 agreement with ambitious reduction targets *ratified* by industrialised countries, it is likely that they must be able to point to significantly greater commitments to mitigation actions being taken in major developing countries than has been the case under the current Kyoto agreement. And it is these ambitious reduction targets for industrialised countries that create the demand-side basis in the international carbon market for increased investments in low-carbon technology in developing countries.

However, to realise this potential, a very large effort is needed in a very short time. This will require proactive leadership in both industrialised and developing countries, as well as in governments and business. A tactical approach to the timing and capacity-building issues, one which may ease the political challenges, could be to identify a number of specific *SNLTs* in specific countries that focus on solving significant emission issues and addressing critical investment needs. Capacity-building and diplomacy efforts could then be directed in particular to these circumstances with a view to doing the necessary preparatory work in 2009.

Some illustrative examples of such efforts could be *SNLTs* for electricity generation in China, Mexico, South Africa, India and Saudi Arabia; for cement in China, Mexico and Brazil; for iron and steel in China, India and South Africa; for gas-flaring emissions in oil and gas production in Indonesia, Nigeria and Saudi Arabia; and for electricity distribution in India. Note that South Korea is not listed here as it has announced its intention of proposing an economy-wide target of some form.

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References

Baron, R. et al. (2007) Sectoral approaches to greenhouse gas mitigation: exploring issues for heavy industry. OECD/IEA Paper.

Baron, R. and Ellis, J. (2006) Sectoral crediting mechanisms for greenhouse gas mitigation: institutional and operational issues. OECD/IEA Paper, COM/ENV/EPOC/IEA/SLT(2006)4.

Colombier, M. and Guerin, E. (2008) Sectoral Agreements, IDDRI.

Ellis, J. and Baron, R. (2005) Sectoral Crediting Mechanisms: an initial assessment of electricity and aluminium, OECD/IEA Paper, COM/ENV/EPOC/IEA/SLT(2005)8.

Schmidt, J. et al. (2006) Sector-based approaches to the post-2012 climate change policy architecture, Center for Clean Air Policy (CCAP), International Future Actions Dialogue, August 2006.

Ward, M. (2008) Architecture of a Global Climate Change Agreement, GtripleC.

Ward, M. et al. (2008) The role of sector no-lose targets in scaling up finance for climate change mitigation activities in developing countries, UK DEFRA.

Ward, M., Garibaldi, J. et al. (2008) Policy instruments and approaches for scaling up investment in climate change mitigation activities – and their interface with the World Bank's new Carbon Partnership Facility, World Bank Carbon Finance Unit.

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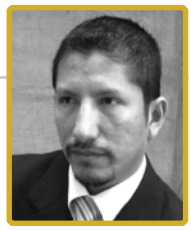


Scaling Up Ghg Emission Reductions Through Replicable Business Models

Abstract
This article describes promising business models to boost GHG emission reductions and aid the maturity of carbon markets. It aims to show that climate change mitigation can benefit from importing business models that are readily available in other commodities markets. The business model selected to perform GHG mitigation can have deep consequences on the future value, scale and tradability of forward and liquid carbon assets. This article shows the need to bring in real secondary market instruments for both supply and demand actors. Through an analogy with other commodities and practices of origination, sourcing and trading, it points out that some of the ingredients to make carbon markets work are already in existence, while others require specific amendments to current rules and carbon registries practices.

The critical success factor for any post-2012 climate protection agreement, yet to be reached, will be its ability to catalyze a set of replicable business models that lead to much needed GHG emissions reductions, either as a core product or as a by-product. Although the final agreement will be the result of a complex process of negotiation among UNFCCC parties, every effort should be made to ensure that it will be effective in implementing both the command-control and incentives measures required to boost climate-protection activities on an unprecedented scale. This article describes business models that may be used to boost climate-protection activities in a post-2012 regime.

To date, the main impact of the climate change agenda on the business community has been threefold:

- Carbon has a price, thanks to a steady demand for GHG reductions and emission allowances

raised by a command-control approach through the legally binding commitments of Annex B Countries of the Kyoto Protocol and the EU-ETS and a growing supply developed through incentives mechanisms (CDM, JI).

- Climate change is recognized as a novel factor that will modify insurance premiums for long-term operations and projects.
- There is an awareness of possible climate-change impacts on food and energy security and the possible connections between biofuels and corn and sugarcane prices.

The Kyoto process has led us through a learning curve regarding how to shape novel markets based on a discrete set of rules. To date, the most mature venue for reducing GHG emissions has been the Clean Development Mechanism (CDM). The future success of this mechanism or its successor depends on our ability to scale up its current applications. Current projections on future carbon credits point to 2Gt of CO2eq by 2012, and to scale this up requires a drastic reshaping of the mechanisms and the way we apply them.

The paper is structured to present new ideas on how successful business practices from other markets can be designed for the carbon market in a post-2012 regime so as to achieve the desired scaling up of GHG reductions. Business practices found in other commodity markets are sketched and the modality of Programmatic CDM is introduced. Following this, the CDM Program of Activities is presented as an instrument with which secondary supply in the carbon market may be developed.. The paper concludes with some remarks and policy recommendations to enable implementation of the business models described here.

Towards the maturity of carbon markets

The post-2012 era will demand greater maturity and sophistication of the supply and demand sides of carbon markets. However, while the demand can be somewhat shaped by command-control measures, the supply side needs to be assisted by a considerable injection of capacity-building and by making both available and applicable instruments used in other commodity markets. Other commodity markets can be described as being composed of four elements (Figure 1).

For example, the primary supply component in the market for orange juice is formed mostly by landowners or potential owners of orange plantations. The secondary supply is formed by wholesalers or aggregators, who facilitate, finance and monetize future orange-juice production in accordance with the terms set by secondary-demand actors such as food and beverage giants. Finally the readily available orange juice is inserted into logistic chains such as supermarkets, which make up the primary demand.

Although carbon markets are quite young and have been progressing fast, serious efforts need to be undertaken to ensure that the four

Figure 1. The basic structure of a mature commodity market

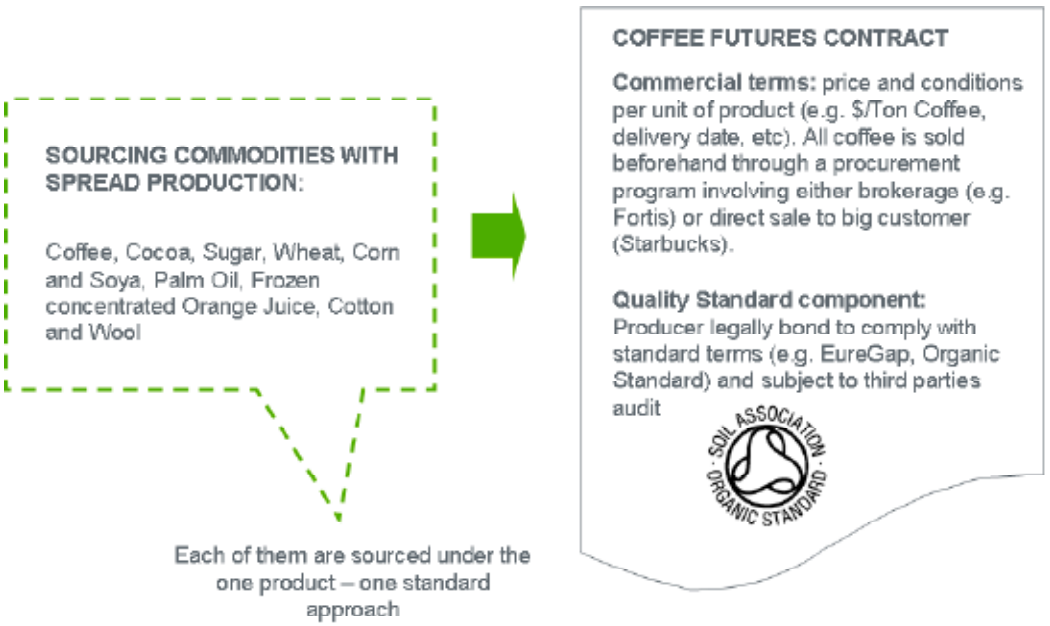
basic components of a commodity market are present. In their early stage, carbon markets were mostly dominated by the demand side through the pioneering activities of governmental procurement programs and multilateral efforts. This was followed by an increase in the number of carbon credit suppliers and capacity-building activities to strengthen institutional capabilities (e.g. DNAs) in non-Annex B parties. This now requires to be complemented by the development of secondary market actors on the supply side who can optimize the way carbon reductions are commissioned, traded and delivered, thus resembling actors with similar roles in other markets, such as wholesalers or aggregators in the case of the coffee or orange juice markets. The element of secondary supply is of fundamental importance because it promises to open up new and up to now unexplored ways of delivering carbon credits.

Secondary supply in other commodity markets

However, pointing to the need for wholesalers or aggregators is not enough: the instruments to make their activities possible also need to be provided. Let us examine the business model used by coffee aggregators. In this case, an aggregator or wholesaler devises a coffee-supply program according to the desired levels of homogeneity, standards and certification compliance established by the demand side. Before the implementation of these supply or sourcing programs, coffee production was generally scattered and atomized, and it was difficult to achieve homogeneity of quality.

To illustrate how this situation was overcome, Figure 2 shows how this and other agricultural commodities with scattered production ranges are aggregated as futures. Here the aggregator or

Figure 2. Secondary supply program with forward agricultural commodities



Source; prepared by the author

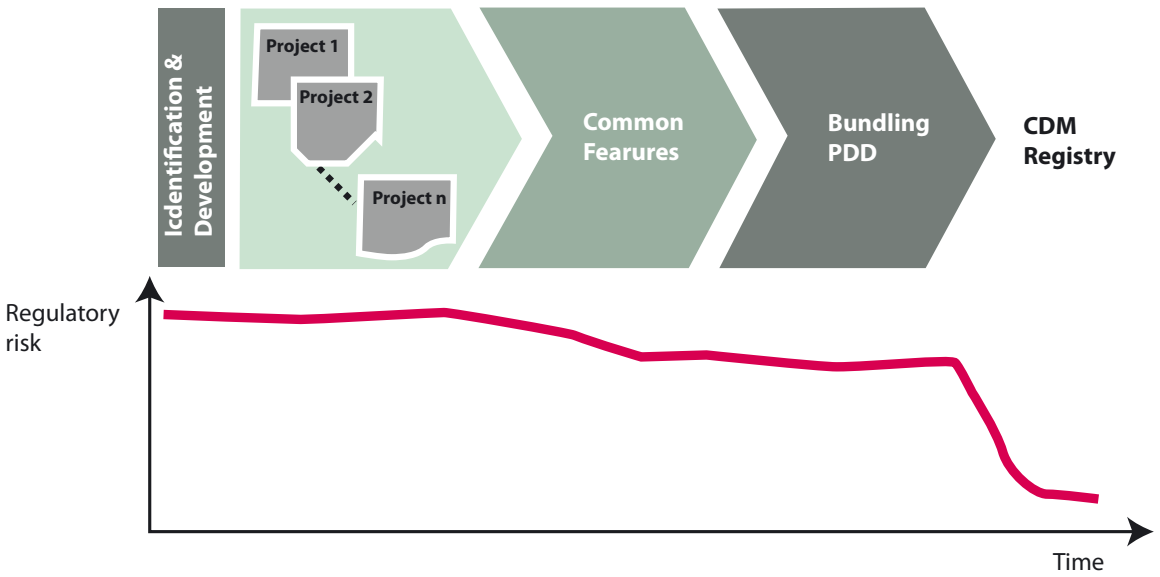
wholesaler intervenes in the design and project implementation terms to ensure full compliance with market requirements such as standards, delivery calendars and quality seals to enable trading of both forward and spot commodities.

Using PoAs for secondary carbon supply

Do we have a similar instrument for carbon markets or something that can be shaped in a similar way? Yes, and it is known as Programmatic CDM. In December 2005, at the first meeting of the parties to the Kyoto Protocol (MOP1), a new CDM modality was agreed: "programmes of activities" (PoAs). PoAs are intended to open the CDM market to replicable projects with low and physically scattered GHG emissions that would have been difficult and time-consuming to develop under the standard CDM model. Programmatic CDM seems to be well suited to energy efficiency, fossil-fuel switching and the use of renewable energies, particularly in private households, small enterprises and transportation. The specific rules for PoAs were developed by the CDM Executive Board (CDM EB), which also approved the templates for project-design documents for programmes of activities (PoADD) and its activities (CPADD), and issued procedures for registering PoAs and issuing CERs. The CDM EB also amended small-scale CDM methodologies to make them applicable to programmatic activities.

In the past, groups of CDM projects were sometimes "bundled" to register them as one larger project or "bundling". However, programmatic CDM has important differences. Bundling requires every single project to be identified and qualified before registration, while a programme can be registered at the concept level without specifying beforehand all its constituent activities but one. Bundling has had limited success in promoting the origination and grouping of small and dispersed projects. One of the reasons for this is

Fig. 3. Risk profile for a bundling scheme



Source: First Climate Group

the fact that the regulatory risk is only reduced after the bundled projects have been registered, which, as with standard CDM projects, happens only after money and effort have been poured into the development of every single project and the drafting of the PDD.

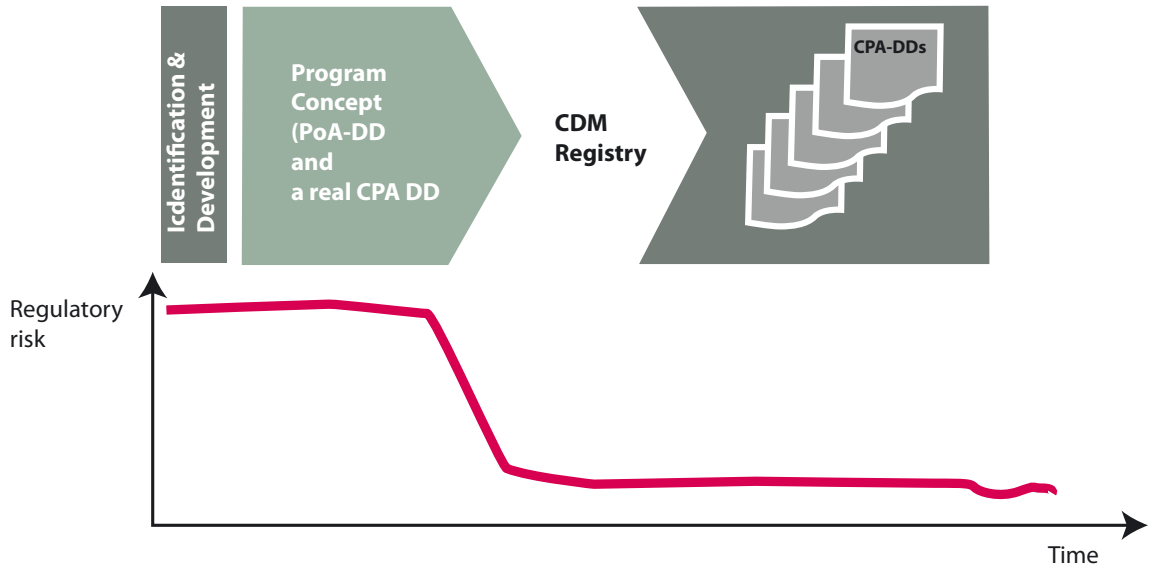
Under the programmatic approach, regulatory risk is handled earlier in the process. Once a PoA has been registered based on a presentation of the concept and at least one real activity to the CDM Executive Board, enrolled PoA participants can embark on their individual activities with greater certainty that their action will be rewarded with CERs.

Under PoAs, constituent Projects are validated and verified by relevant UN-accredited Designated Operational Entities (DoE's), while monitoring is performed by a PoA Managing Entity. In the event of an individual activity ("CPA" in Programmatic CDM jargon) failing to comply with the registered PoA terms, the DoE reports this and the non-compliant activity is put aside. However, the other activities in the programme can continue.

This feature is particularly relevant from the buyer's perspective because the inclusion of PoAs in a portfolio offers a simple way of diversifying risk within a single type of project or technology. In addition, much of the complex management is outsourced to the managing entity, which is entitled to monitor the projects, trade CERs, distribute their benefits and represent all the programme members.

To understand the advantages of a programmatic approach from the perspective of a project developer, consider an initiative to reduce GHG emissions in a given business sector. In many business sectors, there are different levels of maturity and willingness to join such an initiative. Under programmatic CDM early adopters can

Fig. 4. Risk profile for a Programmatic scheme



Surce: First Climate Group

Box 1.

Latest regulatory developments to October 2008

- Programmes of Activities (PoAs) can be registered by presenting the programme concept (PoA Design Document) and at least one real activity ie a CDM Programme Activity (CPA).
- As new activities are identified and developed they can later be enrolled according to the terms of the registered programme.
- A PoA shall use only one approved baseline and monitoring methodology, and implement only one type of technology.
- Since individual CPAs may lead, in some cases, to GHG reductions below the Small Scale threshold the CDM EB upgraded Small Scale Methodologies to render them applicable to PoAs. The upgrade included changes to account for leakage emissions associated with PoAs

Source: adapted from www.unfccc.int/cdm

Box 2.

Programmatic characteristics

Programmatic activities under the CDM may have the following characteristics:

- There are several project developers
- The projects are developed in several places at the same time
- Project activities don't start necessarily at the same time
- In some cases, at the moment the program is registered it is not possible to estimate the emission reductions or the size of the whole program
- The project developers are not known at the time the program is registered. Only the Managing Entity is identified.
- Maximum project duration of 28 years (60 for afforestation and reforestation projects)
- Depending on the registered monitoring plan, the method or approach used to verify emission may include random sampling.

Source: adapted from www.unfccc.int/cdm

join up, while slower movers can join in as it establishes itself.

One of the main selling points in enrolling companies in a programme is that the individual project concept has been validated and that a large part of the regulatory risk has already been taken care of by the managing entity, which registers the programme before the enrolling process begins.

In a similar way to buying a franchise, i.e. a registered business model that works, a company participating in a programme will be able to implement a validated project without distracting itself from its core business. In practice this means that, once the PoA is registered, the Managing Entity will provide the project concept and specific recipe to companies who want to undertake emission-reductions activities framed by such a programme.

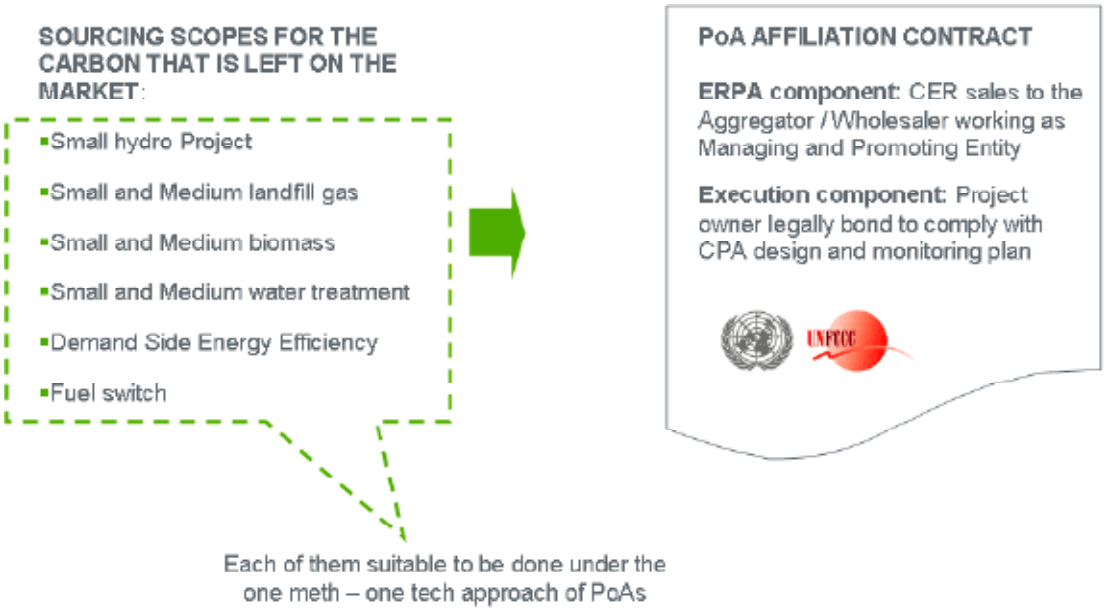
Experience with managing entities of PoAs

So far, opportunities for this novel way of creating carbon value have been arising in business sectors that encompass small- and medium-size enterprises (SMEs), are geographically and/or temporally dispersed, and have a large number of project owners among whom the number of committed PoA members is unknown.

This is often the case in the developing world, where opportunities such as residential lighting, fuel-switching, upgrading or replacing small to medium-size boilers, small landfills, water treatment systems, small hydropower stations and reforestation programmes may proliferate thanks to programmatic CDM.

PoAs are also seen as an opportunity to strengthen environmental reporting and governance in atomised business sectors. In developing economies, governments prioritise the allocation of their scarce environmental law enforcement budget on large-scale industry and natural resource extraction operations, leaving SMEs unmonitored. For instance, in most developing countries, small hydropower plants below a certain capacity (e.g. 10 MW) do not need to conduct an environmental impact assessment, but only present a statement and a brief environmental management plan, which will rarely be audited or followed up by government bureaus.

Fig. 5. Secondary supply with forward CERs coming from PoAs.
The business of coping with climate change has grown more rapidly than previous efforts in any environmental field and has served as a Trojan horse to intervene deeply into corporate agendas and boost participation in climate-neutral activities and voluntary carbon markets.



Source: prepared by the author

However, if owners of small hydropower installations are enrolled in a PoA, the managing entity is entitled to monitor and report their environmental performance, safeguarding the compliance of PoA terms, which would include ecological issues, sound stakeholder relationships, applicable law compliance, and so on.

Another issue to consider is that the project has to be evaluated from both the programme and the project-by-project perspectives. For example,

Once the PoA is registered, the Managing Entity will provide the project concept and specific recipe to companies who want to undertake emission-reductions activities framed by such a programme.

the PoA must indicate at registration the specific information to be provided (from each CPA) to ensure that leakage, additionality, establishment of the baseline, baseline emissions, eligibility and double counting are properly addressed by each CPA within the PoA.

How can PoAs be used as instruments to bring maturity to carbon markets? In a similar way to the business model used by the coffee or orange juice sectors, Programmatic CDM would enable aggregators to act as the managing entities of a PoA. Through this modality, the aggregator or managing entity can ensure that the GHG reductions achieved by its constituent activities (CPAs) comply with the desired levels of homogeneity (same technology), standards (same baseline methodology) and certification (CDM registration), as well as intrinsic risk diversification, see Figure 5.

Final remarks and policy recommendations

To boost carbon supply (demand can be enhanced depending on the outcome of the Bali roadmap), primary demand needs to be aggregated through the use of more sophisticated means (e.g. PoAs) than simply visiting project owners and purchase/finance projects individually. An aggregator or wholesaler (e.g. PoA Managing Entity), a common actor in mature markets, has far greater opportunities to align actual supply with demand terms and conditions, including the provision of delivery guarantees, monetization of carbon contracts, financing in local terms (which enhances liquidity and collection possibilities in case of default) and local due-diligence practices according to the reality found frequently in companies operating in developing countries. It may be even possible, as in other commodity markets, to have several PoAs for the same technology and project type within the same physical areas, thus giving rise to healthy competition to offer the best combination of effectiveness, managing entity fees and PoA support.

PoAs promise to play a major role in strengthening secondary carbon supply and carbon markets maturity in general. To facilitate this development, the following decisions need to be taken as part of the Bali roadmap:

- A successor to the CDM should be defined. Post-2012 GHG reductions coming from project activities registered as CDM before 31 December 2012 are eligible to be certified as tradable carbon credits usable or swappable by other types of carbon credits, thus giving rise to a truly global carbon credit commodity.
- A global carbon credit registry should allow for transactions among permanent non-

Annex I accounts, thus producing a dynamic secondary market on the selling side. This will invite local and regional banks and domestic actors (technology-providers, business groups, etc.) to think and act seriously about carbon origination.

- Eliminate the 1-km limit for neighbouring distance (see debundling tool at EB33 Report Annex 21) between registered CPAs belonging to the same SSC PoA. The 1-km limit can be replaced for a multiphase plan presented before PoA implementation so that a distinction between "future" neighbouring CPAs and actual attempts to split a big project can be spotted without inhibiting the implementation of efficient lighting and energy efficiency PoAs for the residential and commercial sectors and other project types.
- The pros and cons of having a price regulation mechanism (e.g. a carbon central bank to bring equilibrium to the CER/EUA and other carbon credit types "exchange rates") should be considered.

Furthermore, the private sector should be able to:

- Improve the capitalization of GHG reductions obtained by day-to-day capital management in non-Annex B countries. For example, two multilateral financial institutions injected capital into two different instruments: a domestic credit line for energy efficiency and GHG reductions; and a fund to finance low-emission electricity projects. The first initiative was simply coupled with the practices and contracting structures of the domestic bank that was used to allocate the loans. The loans were quickly allocated, but the bank failed to capitalize on GHG reductions of loan receivers, thus leaving them on their own in terms of carbon development support. If local and regional banks were to be properly equipped to capitalize on GHG reductions, this failure would not happen again. The second initiative proved to be very fruitful where the operator assembled a sound portfolio of clean electricity projects across a region, capitalizing not only on GHG reductions but also increasing the market value of the portfolio holder as a whole. Opportunities like this have been identified by the main global electricity suppliers who now value not only having supply capacity, but also a good share of clean electricity installed capacity.
- PoAs should be used as carbon credit supply tools or as secondary supply or sourcing tools. Future supply can be boosted if aggregators or wholesalers intervene at an early stage in enrolling projects or companies in CDM programmes (PoAs).

The critical success factor for any post-2012 climate protection agreement, yet to be reached, will be its ability to catalyze a set of replicable business models that lead to much needed GHG emissions reductions, either as a core product or as a by-product.

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LULUCF UNDER CDM:

Is there a role or even a future in the post-2012 regime?

Abstract:
The post-2012 climate regime is under negotiation. Until now afforestation and reforestation project activities have enjoyed extremely low participation in the carbon market. The principal reasons are that they are not accepted in the EU-ETS and that they generate only temporary credits. The future of these project activities in the post-2012 regime is unclear, as are the role and financing mechanisms for reducing emissions from deforestation and forest degradation (REDD). The aim of this paper is to explain the current role of LULUCF and the limitations in the CDM and offer some ideas for possible improvements.

The Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) allows developed countries with greenhouse gas (GHG) reduction commitments to buy certified emissions reductions (CERs) to meet their targets. The CERs are to be generated through project activities under the Clean Development Mechanism (CDM), as defined in Article 12 of the Kyoto Protocol. Different types of project activity may be developed under the CDM, including land use, land-use change and forestry (LULUCF).

According to the current rules of the CDM for the first commitment period 2008-2012, only afforestation and reforestation (A/R) project activities are eligible under all potential LULUCF activities. These kinds of project enjoy extremely low demand among buyers in the carbon market. In order to increase the number of A/R

projects in the carbon market and to explore the potential of other LULUCF activities, such as reducing emissions from deforestation and forest degradation (REDD), it is necessary to revise the current modalities and procedures. The main aim of this paper is to offer some "food for thought" to help negotiate LULUCF 's role in the post-2012 regime.

Until now afforestation and reforestation project activities have enjoyed extremely low participation in the carbon market; the principal reasons are that they are not accepted in the EU-ETS and that they generate only temporary credits.

Specifically, the aims of this paper are to explain the genesis of the current rules related to A/R CDM projects activities; identify the main reasons for the low participation of A/R CDM projects activities in the carbon market; propose modifications to the current A/R rules for the post-2012 climate regime; and discuss the potential for including project activities related to REDD in the CDM under the post-2012 climate regime.

For this purpose, the paper is divided into the following sections: the present introduction; the history of LULUCF negotiations under the Kyoto Protocol; the experience gained from current projects and methodologies; proposals for improvements to the current rules; the particular case of reducing emissions from deforestation and forest degradation (REDD); and conclusions.

The history of LULUCF negotiations under the Kyoto Protocol

In 2003, at the 9th Conference of the Parties (COP 9) to the UNFCCC, delegates from different countries worked hard to finish discussions and to agree on the "modalities and procedures for A/R project activities under the CDM in the first commitment period of the Kyoto Protocol" (Decision 19/CP.9).[1]

The negotiations started just after the conclusion of the Marrakesh Accords (agreed in 2001 at COP 7), and had as their main guide the decision related to LULUCF (Decision 11/CP.7)[2] and the modalities and procedures for CDM (Decision 17/CP.7).[3]

To guarantee the environmental integrity of the Kyoto Protocol, Decision 11/CP.7 affirms that the treatment of LULUCF activities must be governed by certain principles (see Box 1). The principles should be applied in all commitment periods of the Kyoto Protocol and have the aim of guaranteeing that the removals obtained through LULUCF activities are real, measurable and verifiable. Special attention should be given to principle *g*: "That reversal of any removal due to land use, land-use change and forestry activities be accounted for at the appropriate point in time". Because of this principle, the removals from A/R project activities were considered temporary in the development of the current A/R CDM rules.

Decision 11/CP.7 also adopted definitions, modalities, rules and guidelines relating to LULUCF

1 After Kyoto Protocol entered into force, became Decision 5/CMP.1 (http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=61)

2 After Kyoto Protocol entered into force, became Decision 16/CMP.1 (http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=3)

3 After Kyoto Protocol entered into force, became Decision 3/CMP.1 (http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=6)

activities, *for application in the first commitment period*. It is important to highlight that the decision was agreed only for the first commitment period, because of which it is possible to revise the content of such decisions in the negotiations over the post-2012 climate regime. The decision clearly states that: "The treatment of LULUCF project activities under Article 12 in future commitment periods shall be decided as part of the negotiations on the second commitment period".

For the CDM, Decision 11/CP.7 limited the eligibility of LULUCF project activities to afforestation and reforestation. In both cases, project proponents need to encourage the conversion of land without forest to forested land through planting, seeding and/or the human-induced promotion of natural seed sources. The only difference between afforestation and reforestation is the period of time during which the project proponent needs to check the "non-forest status" of the land. For afforestation no forest must have grown on the land for a period of at least fifty years. For reforestation projects, the proponent need only check the status of the land as of 31 December 1989.

The possibility of including REDD in the CDM was therefore excluded for the first commitment period (see further discussions on REDD in the section below).

Decision 11/CP.7 also established that: "the total of additions to a Party's assigned amount resulting from eligible LULUCF project activities under the CDM shall not exceed one per cent of base year emissions of that Party, times five". This means that there is a limit to the amount of CERs from A/R CDM project activities that a developed country can use to meet its target. According to

BOX 1.
Principles related to LULUCF adopted in Decision 11 CP.7

a. That the treatment of these activities be based on sound science;
b. That consistent methodologies be used over time for the estimation and reporting of these activities;
c. That the aim stated in Article 3, paragraph 1, of the Kyoto Protocol not be changed by accounting for land use, land-use change and forestry activities;
d. That the mere presence of carbon stocks be excluded from accounting;
e. That the implementation of land use, land-use change and forestry activities contributes to the conservation of biodiversity and sustainable use of natural resources;
f. That accounting for land use, land-use change and forestry does not imply a transfer of commitments to a future commitment period;
g. That reversal of any removal due to land use, land-use change and forestry activities be accounted for at the appropriate point in time; and,
h. That accounting excludes removals resulting from:
(i) elevated carbon dioxide concentrations above their pre-industrial level;
(ii) indirect nitrogen deposition; and
(iii) the dynamic effects of age structure resulting from activities and practices before the reference year.

Bernoux et al. (2002),[4] the market size for A/R CDM carbon credits would only be about 110 Mt CO_2 for the first commitment period of the Kyoto Protocol.

While Decision 11/CP.7 laid down the principles, definitions and limits for inclusion of LULUCF activities under the CDM, decision 17/CP.7 provided a "legal structure", i.e. the headings and a first negotiating text on the basis of which delegates negotiated the specific modalities and procedures for A/R project activities under the CDM.

During the negotiations, many countries had strong reservations, in some cases even raising objections, to LULUCF project activities. Deep differences appeared on many aspects, such as the date for the definition of reforestation and how to treat the non-permanence of the removals from the forestry (principle *g* of Decision 11/CP7). As a result conclusions were delayed until 2003 at COP 9, where the Parties agreed on the modalities and procedures regarding A/R CDM project activities (Decision 19/CP.9).

Because of such divergences, it is important to recall that Decision19/CP.9 also decided:[5]

> *that the treatment of LULUCF project activities under the CDM in future commitment periods shall be decided as part of the negotiations on the second commitment period and that any revision of the decision shall not affect A/R project activities under the CDM registered prior to the end of the first commitment period;*

and

> *to periodically review the modalities and procedures for A/R project* activities under the CDM, and that the first review shall be carried out no later than one year before the end of the first commitment period, based on recommendations by the Executive Board of the CDM and by the Subsidiary Body for Implementation, drawing on technical advice from the Subsidiary Body for Scientific and Technological Advice, as needed.

These passages clearly give a legal mandate to try and improve the current rules. These improvements are necessary since few A/R CDM project activities are being proposed. They also represent a "political will" that existed in 2003 but may now be lost in the negotiations for a post-2012 climate regime.

The experience learned from current projects and methodologies

According to the UNEP Risø Centre,[6] on 1 September 2008 there were 3,819 CDM project activities in the pipeline. Of this total, only five project activities relate to afforestation and 22 to reforestation. This represents only 0.13% and 0.58% respectively of the projects in the pipeline and, in terms of potential 2012 CERs, only 0.07% and 0.43% respectively.

The extreme low participation of A/R CDM project activities in the carbon market cannot be explained by the lack of methodologies as in the past. At the time of writing, fourteen *baseline* and monitoring methodologies had been approved by the Executive Board.[7] This means that project

4 Bernoux, M.; Eschenbrenner, V.; Cerri, C.C.; Melillo, J.M.; Feller, C. LULUCF-based CDM: too much ado for... a small carbon market. Climate Policy 2 (2002) 379–385.

5 See http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=61 paragraph 3 and 4.

6 UNEP Risoe CDM/JI Pipeline Analysis and Database, September 1st 2008 - http://www.cdmpipeline.org/publications/CDMpipeline.xls

7 http://cdm.unfccc.int/methodologies/ARmethodologies/index.html

proponents have fourteen different methodologies to determine and estimate the baseline[8] and the "net anthropogenic greenhouse gas removals by sinks".[9] Probably around 80% of all potential A/R project activities under the CDM are covered by the approved methodologies.

Different reasons explain the extremely low participation of A/R CDM project activities in the carbon market. In order of importance, the main reasons are:

1. N**o acceptance under the EU ETS (European Union Emission Trade Scheme):** the European Union does not buy CERs from A/R CDM to comply with its emission reductions targets, with the arguments that:[10]

    - "LULUCF projects cannot physically deliver permanent emissions reductions. Insufficient solutions have been developed to deal with the uncertainties, non-permanence of carbon storage and potential emissions 'leakage' problems arising from such projects. The temporary and reversible nature of such activities would pose considerable risks in a company-based trading system and impose great liability risks on Member States;
    - The inclusion of LULUCF projects in the ETS would require a quality of monitoring and reporting comparable to the monitoring and reporting of emissions from installations currently covered by the system. This is not available at present and is likely to incur costs which would substantially reduce the attractiveness of including such projects.
    - The simplicity, transparency and predictability of the ETS would be considerably reduced. Moreover, the sheer quantity of potential credits entering the system could undermine the functioning of the carbon market unless their role were limited, in which case their potential benefits would become marginal."[11]

There are high expectations concerning the positive incentives that could come from REDD, especially in countries that see REDD as the only profitable way to enter the "carbon market".

2. **Temporary credits:** In order to take into consideration one of the main concerns of Parties, namely the potential non-permanence of the forest (principle g of Decision 11/CP.7), decision 19/CP.9, introducing temporary credits for A/R CDM project activities, was adopted. There are two types of temporary credit: i) "Temporary CER"

8 The baseline scenario for an A/R CDM project activity is the scenario that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the proposed project activity (http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM_v04.pdf)

9 Defined as 'the actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage' http://cdm.unfccc.int/Reference/Guidclarif/glos_CDM_v04.pdf

10 Questions and Answers on the Commission's proposal to revise the EU Emissions Trading System - MEMO/08/35 (23/01/2008). Available at: http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/35

11 Questions and Answers on the Commission's proposal to revise the EU Emissions Trading System (MEMO/08/35) – available at: http://ec.europa.eu/environment/climat/emission/ets_post2012_en.htm

(tCER), which expires at the end of the commitment period following the one during which it was issued. For example, a tCER issued in 2007 will expire at the end of the first commitment period, e.g. 31 December 2012; ii) "Long-term CER" (lCER), which expires at the end of the crediting period of the A/R CDM project activity. For example, if an lCER is issued in 2007 and the A/R CDM project activity has a crediting period of 30 years, the lCER will expire in 2037. In this sense, the temporary credits from A/R CDM project activities can be considered a "rent", where the project proponent undertakes the obligation to remove and retain a certain quantity of CO_2 during a specific period of time. At the end of the rent contract, the project proponent is free to release the CO_2 (cut the forest), and the buyer must replace the credit.

3. **Complexity and cost of the approved baseline and monitoring methodologies:** One of the main complaints of project developers is that the A/R methodologies are, in most cases, relatively more complex and costly than non-A/R methodologies.

4. **Limits on the use of tCERs or lCERS:** As already pointed out ,the total amount of carbon credits from A/R CDM project activities that can be used by developed countries to meet their emission reduction target under the first commitment period of the Kyoto Protocol is limited. For other reasons, nowadays even the limit is not achieved.

Proposals for improvements to the current rules

Among the reasons cited above, reason 3 (and the monitoring quality raised by the EU) could be dealt with in the context of the Afforestation and Reforestation Working Group (AR-WG) under the CDM Executive Board (EB). The AR-WG was established to draw up, among other things:

> *recommendations on options for expanding the applicability of methodologies for CDM A/R project activities, if applicable, and develop tools to facilitate the selection of one approved methodology from among those of a similar nature by project participants.*[12]

The work of the group is similar to the Methodologies Panel (Meth Panel).

In this sense, the consolidation process started with methodology AR-ACM0001 is very welcome.[13] Further consolidations could be used to simplify the methodologies, taking into consideration, of course, the environmental integrity of the Kyoto Protocol. A deeper look at the methodologies from non-forestry project activities might inspire the process. Also, the development of tools could represent a powerful simplification, especially if they could be accompanied by user-friendly software. Of course, if AR-WG is guided only by an "academic spirit ", consolidation and tools could have the opposite effect of simplification by creating methodologies that are more complex and costly.

12 Terms of reference for the afforestation and reforestation working group (EB23, Annex14)

13 Afforestation and reforestation of degraded land - Version 1 (http://cdm.unfccc.int/UserManagement/FileStorage/CDM_ACMMEBS-DLJ565IKTQC14YSI0WK3BVUJYN02)

However, the most important reasons (1 and 2) for the low participation of AR CDM project activities in the carbon market can only be solved by political decisions.

According to the directive proposal for EU ETS Phase III[14] (2012 to 2020), A/R CDM project activities will still be banned. The EU needs to revise its reasons for not accepting A/R CDM project activities and even propose different ways to deal with the issue of non-permanence.

In the UNFCCC context, the recent conclusions of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP)[15] acknowledged that further discussions on LULUCF should take into account the principles established by decision 11/CP.7. In relation to the project-based mechanisms there are two possible approaches:

(a) Make a few changes in the current rules, meaning that only the legally required changes will be made to the current modalities and procedures (the same rules will apply **mutatis mutandis** *for post-2012, and only the reference to the first commitment period will be deleted from the rules);*

(b) Make more changes to current rules, meaning that non-permanence, leakage, measurements, definitions and others elements could be revisited as necessary.

In both arenas (EU ETS and UNFCCC), first of all, there is a need for "political will" to make real revisions and possible improvements to the current modalities and procedures. "Political will" in this context means that *countries need to agree that LULUCF project activities can or should play a bigger role in the post-2012 regime. Some of the limitations that project activities may have (e.g. non-permanence and monitoring costs) could be solved by a real learning-by-doing approach or by being treated differently in specific situations*, even if they produce losses in "simplicity, transparency and predictability". Also, there is always the possibility to define acceptable losses in "simplicity, transparency and predictability".

If the temporary credits solution remains in the post-2012 regime and will also be applied to REDD credits, then probably the demand for LULUCF CDM project activities will remain extremely low, being incapable of raising the amount of financial resources needed to make LULUCF a real contribution to climate-change mitigation.

During the process of agreeing Decision 19/CP.9 (2003), there was a "political will" that predicted the revision of the modalities and procedures (see quote above) after experiences were made. Unfortunately, the current modalities and procedures did not create the necessary number of projects to make up a diverse, concrete and real experience. In other non-forest cases, the improvements were only possible due to experience learned from concrete projects (e.g. monitoring of CH4 emissions in manure management projects and landfill ex-ante estimates).

Now, in the current discussions on the role of LULUCF post-2012, especially in the AWG-KP, it seems that some Parties do not have the strong political will needed to discuss the issue further.

14 http://ec.europa.eu/environment/climat/emission/ets_post2012_en.htm

15 For example: FCCC/KP/AWG/2008/L.5 - http://unfccc.int/resource/docs/2008/awg5/eng/l05.pdf

If parties really want to create more space for LULUCF projects in the post-2012 regime, it is necessary to demonstrate some trust in these kinds of project and to explore new ideas regarding the challenges and, if necessary, pay the costs of developing such ideas.

With regard to non-permanence, one new idea to be explored further is to establish some kind of forest (native forest without any commercial exploration) in countries with a legal and enforceable framework for forest protection. The forest could be subjected to low-cost monitoring procedures after the final verification with the aim of extending permanence beyond the current time limit imposed by the temporary credits. After the end of the crediting period, the carbon credits created remain valid as long as the project proponent demonstrates evidence that the forest remains on the ground. Such evidence could be limited to satellite images or photographs every five years, after the last verification. It would not require further carbon stock measurements after the last verification, assuming that the forest does not enter in a process of degradation after establishment.

Other ideas to deal with the non-permanence issue include the establishment of buffer zones that could serve as a form of insurance, and host countries assuming the liability of the "reversal of any removal". All of them could have high cost. It is important to emphasize that the technical debates should be started without the "political will" and will probably repeat discussions and conclusions from 2003, i.e. the "temporary credits". Finally, caps (as explained in reason 4) could still be used in order to accommodate concerns regarding environmental integrity.

BOX 2.
Indicative guidance for REDD demonstration activities

1. Demonstration activities should be undertaken with the approval of the host Party.
2. Estimates of reductions or increases in emissions should be results-based, demonstrable, transparent, verifiable, and estimated consistently over time.
3. The use of the methodologies (Good Practice Guidance for Land Use, Land-Use Change and Forestry) is encouraged as a basis for estimating and monitoring emissions.
4. Emission reductions from national demonstration activities should be assessed on the basis of national emissions from deforestation and forest degradation.
5. Subnational demonstration activities should be assessed within the boundary used for the demonstration, and assessed for associated displacement of emissions.
6. Reductions in emissions or increases resulting from the demonstration activity should be based on historical emissions, taking into account national circumstances.
7. Subnational approaches, where applied, should constitute a step towards the development of national approaches, reference levels and estimates.
8. Demonstration activities should be consistent with sustainable forest management, noting, inter alia, the relevant provisions of the United Nations Forum on Forests, the United Nations Convention to Combat Desertification and the Convention on Biological Diversity.
9. Experiences in implementing activities should be reported and made available via the Web platform
10. Reporting on demonstration activities should include a description of the activities and their effectiveness, and may include other information.
11. Independent expert review is encouraged.

The particular case of REDD

Reducing emissions from deforestation and forest degradation (REDD) is becoming more attractive than afforestation and reforestation, at least in the negotiations. There are high expectations from various countries about the outcome of the negotiations. The negotations re-started in 2005, when the Government of Papua New Guinea by its communication dated 28 July 2005, requested the secretariat to add an item titled 'Reducing emissions from deforestation in developing countries: approaches to stimulate action' to the provisional agenda of the Conference of the Parties at its eleventh session.

After the initial submission from Papua New Guinea and Costa Rica,[16] many other submissions were made, workshops were held, and a decision was taken in Bali in the context of the "Road Map"[17]. The main element in that decision is the possibility of Parties to undertake **"demonstration activities"** following indicative guidance (see Box 2).

Countries are working on the development of these demonstration activities, especially with the help of the **Forest Carbon Partnership Facility** from the World Bank.

> *The new Forest Carbon Partnership Facility is designed to set the stage for a large-scale system of incentives for reducing emissions from deforestation and forest degradation, providing a fresh source of financing for the sustainable use of forest resources and biodiversity conservation.... The Forest Carbon Partnership Facility will build the capacity of developing countries in tropical and subtropical regions to reduce emissions from deforestation and forest degradation and to tap into any future system of positive incentives for REDD. In some of these countries, the FCPF will also help reduce the rate of deforestation and forest degradation by providing an incentive per ton of carbon dioxide of emissions reduced through specific Emission Reductions Programs targeting the drivers of deforestation and forest degradation.*[18]

As pointed out before, there are high expectations concerning the positive incentives that could come from REDD, especially in countries that see REDD as the only profitable way to enter the "carbon market". Some caution is needed, however, since, even if REDD becomes eligible under the CDM in the post-2012 regime (and nowadays there is no guarantee that this will happen), the same constraints that apply to A/R (e.g. temporary credits) could apply to REDD. As a result, the demand for REDD credits could be extremely limited, with no effective result in reducing deforestation and no effective payments. In this sense, discussing the inclusion of REDD in the CDM without solving the problem of non-permanence seems irrelevant.

Besides the results of the negotiation process, there are many challenges that countries must overcome in order to achieve REDD:

1. *Coordination:* because of the complexity of REDD, many and different actors must be involved in the different phases. All countries find coordination among all these different actors to be one of the biggest challenges;

16 http://unfccc.int/resource/docs/2005/cop11/eng/misc01.pdf

17 http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=8

18 http://carbonfinance.org/fcpfhttp://carbonfinance.org/fcpf http://carbonfinance.org/fcpf

2. *International leakage:* in certain situations, there is a large potential of leakage over countries' borders;
3. *Opportunity costs*: because of the characteristics of some of the main drivers for deforestation and degradation, some opportunity costs could be very difficult to determine and to compete with them. In this case, countries could combine carbon revenues with other financial resources (e.g. over-pricing due to agriculture certification) and have a close dialogue with the private sector;
4. *Institutional arrangements for deforestation and degradation:* some drivers of deforestation and/or degradation have such complex, articulated and strong institutional arrangements (based on a triangular division of actors) that REDD will demand deep and painful modifications going far beyond "payments for environmental service". This will be especially the case if these payments are intended to benefit primarily communities and do not benefit the intermediary actors present at the institutional arrangements. These intermediary actors could be those that will manipulate the communities, but they will also be used by the top actors to maintain the *status quo*;

At the same time, there are many opportunities that countries could explore in achieving REDD:

1. *Sharing:* exchanging information and knowledge between all countries and relevant organizations and stakeholders. This could include a web platform, seminars and workshops, peer-to-peer meetings, reports and publications, etc.
2. *Non-forest approach:* because of the characteristics of some of the main drivers for deforestation and degradation, the main potential solutions could lie outside the forest sector. This imposes great challenges, since the opportunity costs could be much higher, and coordination with non-forest organizations and/or non-forest governmental bodies more complex;
3. *Reducing emissions beyond REDD*: some of the main opportunities for particular countries could be outside reducing deforestation and/or degradation (e.g. conversation and enhancement of carbon stocks);
4. *Regional approach:* this is definitely something to explore, taking into consideration not only the potential benefits, but also the technical and political consequences.

Conclusions

There is definitely a mandate and a need to revise the current modalities and procedures for LULUCF project activities under the CDM. It is not clear whether Parties have the "political will" to do this at the level necessary to produce concrete and consistent results. Political will is the main element necessary to decide what kind of modifications will be applied to A/R and REDD in the post-2012 climate-change regime.

Unfortunately there are not many LULUCF activities that can benefit from the "learning by doing" approach. In the non-A/R context, many of the revisions for the post-2012 regime could be based on concrete experience and cases.

Besides this limitation, there is no reason to give up on forestry project activities in the post-2012 regime. It is unnecessary to explain that reducing emissions from LULUCF is an important part of the achievement of the UNFCCC objective.

Also, it is not necessary to choose between A/R and REDD. In fact, in some cases they must be implemented together. They could also have different sources of financing: A/R through carbon credits and REDD through funds.

One common element between A/R and REDD is the treatment of non-permanence. If the temporary credits solution remains in the post-2012 regime and will also be applied to REDD credits, then probably the demand for LULUCF CDM project activities will remain extremely low, being incapable of raising the amount of financial resources needed to make LULUCF a real contribution to climate-change mitigation. The main focus of the discussion should be to find alternative ways to deal with the non-permanence issue. Without an alternative approach, inclusion of REDD in the CDM could become irrelevant.

Because of the complexity of the problem of climate change, including the negotiation process, possible improvements in the A/R modalities and procedures, and especially decisions concerning REDD, cannot be treated in isolation. They will influence and be influenced by other items of the negotiation agenda.

Adopting an analogy made by an expert on the carbon market in the last Carbon Expo regarding the actual stage of non-A/R CDM project activities: "The low hanging fruits are gone, we need to start planting new fruit trees". In the case of the forestry projects, it is not possible to say that until now almost no fruit has been collected because the decisions taken in the past have created a very low demand for this kind of fruit. For the post-2012 regime, it is necessary to make the "forestry fruit" more attractive in order to harvest some of these fruits and in fact plant some trees.

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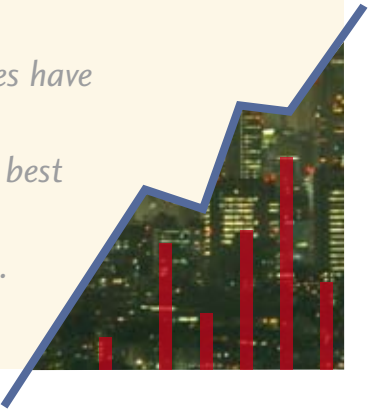
The annual CD4CDM Perspectives Series features a topic of pivotal importance to the global carbon market. The series seeks to communicate the diverse insights and visions of leading actors in the carbon market to better inform the decisions of professionals and policymakers in developing countries. The second theme of the series focuses on how the CDM can be reformed in a post-2012 climate regime, including new mechanism for sustainable development. Seventeen contributors from the private sector, Designated National Authorities, the Executive Board, research, and development agencies present their perspective on meeting challenges such as the unequal regional distribution of CDM projects, concerns about environmental integrity and technology transfer, complex governance procedures, and questions about the CDM's contribution to sustainable development. The new ideas and solutions to these challenges proposed by the authors in this edition of Perspectives have been solicited to help professionals and policy makers make the best decisions in the lead-up to COP 15 in Copenhagen and beyond.



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