

From Clean Development Mechanism to Sectoral Crediting Approaches – Way Forward or Wrong Turn?

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Summary

The Clean Development Mechanism (CDM) has been a mixed success. On the one hand, it has mobilised thousands of projects and billions of investments in a very short timeframe. On the other hand, it has faced serious criticism as to the strength of the incentive it actually provides, its environmental integrity and its contribution to sustainable development.

Sectoral approaches have been discussed as one means to overcome the weaknesses of the current CDM. They would by definition be better suited to achieving sector-wide transformations and might in particular give a boost to small-scale and decentralised renewable energy, energy efficiency and transport projects. They would also remove the necessity of testing additionality on a project-by-project basis.

However, the quantification of emissions and reductions for sectoral approaches would have to rely on modelling and projections, which always possess a degree of uncertainty. It is therefore imperative to assess the reliability of quantifying developing country reductions at the sectoral level before scaling up uncapped trading.

The strength of the incentive provided by sectoral approaches would crucially depend on the ratio between demand and supply. The demand is set politically by the targets adopted by industrialised countries. The supply of reductions in Southern countries is potentially massive. If the support for Southern countries that is necessary to stop global emissions growth in the next decade was to be mobilised primarily through the carbon market, the targets for industrialised countries would have to be significantly tighter than are currently being discussed.

As for sustainable development benefits, one has to note that these are not necessarily tied to the level of implementation. Especially the concerns raised about host countries' sustainable development criteria and the lack of possibilities for local stakeholders to be meaningfully involved in the approval process are independent of the types of projects proposed. Also, sectoral approaches would not alter the CDM's basic design of giving a monetary value only to a project's emission reductions but not to other sustainability benefits.

Sectoral approaches may be a way for Southern countries to gradually move towards emission limitation commitments in the framework of the climate regime. However, the post-2012 negotiations should conclude by the end of 2009 and it would in all likelihood not be possible to reach the necessary agreement on the rules, countries/sectors covered and Southern countries' levels of ambition for sectoral approaches in that timeframe, especially due to the amount of data that would be required. It may therefore be necessary to ini-

tially frame the post-2012 participation from Southern countries in terms of commitments to certain policies and measures and aim for the graduation to sectoral emissions trading as an option for the medium and longer term.

Based on this analysis, the paper derives four main recommendations for the future development of the CDM.

Start pilot phase for sectoral approaches

The discussion about sectoral approaches is still fraught with a high number of uncertainties and being pursued mainly at the theoretical level. It would therefore be useful to start a pilot phase to test sectoral approaches in practice, similar to the Activities Implemented Jointly (AIJ) phase that preceded the introduction of the CDM and Joint Implementation.

Shift activity-based CDM from bottom-up to top-down approaches

Due to the amount of data gathering necessary, if at all feasible sectoral approaches are probably a perspective for the medium rather than for the short term. Moreover, probably only the more advanced Southern countries would be able to use sectoral approaches. The activity-based CDM will therefore probably still have a role in the post-2012 regime. However, the mechanism should be urgently reformed to remedy the deficits that have become apparent as regards its environmental integrity. In particular, methodology development should be shifted from the current bottom-up to a top-down approach where this is possible based on objective criteria such as technology penetration rates and sectoral benchmarks and where additionality can be demonstrated. The EB and its panels should be enabled to develop these methodologies on their own initiative rather than having to wait for proposals from project participants.

Reopen debate on best approaches to ensuring a contribution to sustainable development

Southern countries have in the past resisted the introduction of mechanisms to assess projects' contribution to sustainable development at international level. However, the debate has so far been characterised by a false dichotomy of either full or no international regulation at all. Creativity could be invested to find a middle way which could both raise sustainability standards while safeguarding Southern countries' sovereignty.

Create linkages to other discussions on financing and technology cooperation

In parallel to the discussions about the future of the CDM there is a whole set of negotiations under the Bali Roadmap on mechanisms for financing and technology cooperation. It would be highly advisable to strive for coherence between these negotiations.

1 Introduction

Under the Kyoto Protocol's Clean Development Mechanism (CDM), industrialised countries (Annex I countries) can finance greenhouse gas (GHG) emission reduction projects in Southern countries (non-Annex I countries) and count the resulting Certified Emission Reductions (CERs) towards their Kyoto emission targets. In addition, in many industrialised countries companies can also purchase CERs and count them towards their national climate protection obligations. The purpose of this mechanism is to allow industrialised countries to tap into low-cost emission reduction potential in other countries and thus achieve their Kyoto targets more cost-efficiently. Moreover, the CDM is to assist the host countries in achieving sustainable development.

While implementation of the CDM was slow at first, the mechanism is now developing very rapidly. Currently, about 3,300 projects have been registered or are at the validation stage, expecting an annual 480 million CERs and a cumulative 2.6 billion CERs by 2012 (Fenhann and Lema 2008).

Nevertheless, there is a high number of voices in the international climate policy arena that are calling for improvements to the way the mechanism functions. Critics claim that the process leading to the registration of a project activity and the issuance of CERs is too complex and costly. At the same time, the CDM is accused of failing to screen out non-additional projects despite its complexity. Furthermore, there have been complaints that several types of projects that are very important for sustainable development, such as energy efficiency and transport project activities, are not competitive in the CDM market and are becoming marginalised. Many are also disappointed because CDM project activities have so far concentrated in relatively few countries and regions while, for example, most of Africa has so far been bypassed. Finally, due to its design as a project-based mechanism, some see the CDM as fundamentally incapable of achieving essential structural changes on the scale necessary to combat climate change (see e.g. Cosbey et al. 2005; Figueres et al. 2005; Michaelowa and Purohit 2007; Pearson 2004; Schneider 2007).

In the context of this discussion, the concept of "sectoral approaches" has been intensively discussed as one potential means to address some of these problems. Different people have defined this concept in different ways, but the fundamental idea is to transcend the single-site approach that has so far characterised most CDM project activities. This discussion is becoming especially important in the context of the negotiations for a new agreement for the period after 2012, when the first commitment period of the Kyoto Protocol expires.

This paper has a twofold aim. First, it analyses the current CDM and in particular its shortcomings in promoting a low-GHG sustainable development. Second, it tries to assess in how far sectoral approaches could address the concerns that have been raised. The article is based on synthesising and discussing the findings of the relevant literature.

The paper begins with a brief overview of the strengths and weaknesses of the CDM, with a focus on weaknesses to serve as basis for the discussion in how far sectoral approaches would be able to address them. Secondly, discussions about the further development of emissions trading after 2012 should be guided by an understanding of how emission reduction options are structured and who are the actors that would need to

make investment decisions. The paper therefore briefly discusses mitigation options, though without a claim to being comprehensive. This discussion is followed by an outline of the different definitions that have been put forward for sectoral approaches and a discussion of in how far sectoral approaches might help to address the perceived shortcomings of the current CDM. Finally, the article discusses how sectoral approaches may fit in with the overall post-2012 climate regime. The article concludes with an overall assessment of the viability of sectoral approaches and their capacity to enhance the current CDM.

2 Strengths and Weaknesses of the Current CDM

The CDM has had a number of successes in its development so far. Not least among them is that it is functioning at all. The CDM was the first mechanism of its kind at the international level and therefore had to overcome a significant number of regulatory obstacles as well as financial constraints in its first years of operation. It was “prompt started” by the seventh Conference of the Parties (COP 7) to the United Nations Framework Convention on Climate Change (UNFCCC) in Marrakesh in 2001 but nevertheless took more than three years until the first project was registered in 2004. By now, the initial hurdles and bottlenecks seem to have been mostly overcome and the mechanism has reached a scale of thousands of projects and gigatonnes of emission reductions.

As a result of this dynamic development, the CDM has in a very short timeframe mobilised billions of investments. The capital that was invested in projects registered in 2006 alone was estimated at 7 billion US\$ (UNFCCC 2007a: 140). The CDM has in many countries initiated an intensive search for emission reduction opportunities and in some areas, most notably the highly potent greenhouse gases such as hydrofluorocarbons (HFCs), effected an abrupt break of emission trends. By making it possible to make a profit from reducing emissions, the CDM has also contributed to raising awareness about the climate problem.

Moreover, in contrast to traditional development financing, the CDM enables “bottom-up” initiatives from the host countries. Southern project developers do not depend on industrialised country partners to submit projects for registration. Only when the CERs have been generated and are to be sold, a Northern partner needs to be registered as project participant. This allows Southern entities to develop and implement projects according to their own priorities and then look for the most attractive buyer (provided they dispose of the financial and technological means necessary to implement a project independently). In fact, more than a third of the projects currently in the pipeline are such “unilateral” projects (Fenhann und Lema 2008).

However, the CDM also has several weaknesses, which impair both its usefulness as a financing instrument as well as its environmental integrity. These are:

- Structural limitations to the incentives the CDM provides
- Doubts about the environmental integrity of the CDM
- Doubts about the contribution to sustainable development

The following will go over these three problem areas in turn. Table 1 summarises the main points of criticism.

Table 1: Weaknesses of the Current CDM

| Strength of Incentive | Environmental Integrity | Sustainable Development |
|---|---|--|
| <ul style="list-style-type: none"> • Need for prefinancing • High transaction costs • Revenue risks • Prices too low for important project categories • Market-based mechanism focuses on emerging economies • Important sectors such as transport, demand-side energy efficiency difficult to address with CDM • No incentive for sectoral transformation | <ul style="list-style-type: none"> • Zero-sum game, CDM reductions “offset” higher emission in industrialised countries • Additionality in most cases difficult if not impossible to prove and validate | <ul style="list-style-type: none"> • Assessment at discretion of host countries, criteria often weak • Often no meaningful involvement of stakeholders • CDM gives monetary value only to emission reductions, not other benefits • Important sectors such as transport, demand-side energy efficiency difficult to address with CDM • No incentive for sectoral transformation |

2.1 Structural Limitations to the Incentives the CDM Provides

The incentives provided by the CDM for low-emission projects are constrained by a number of factors.

Projects often require financing before the start of the project. CERs, however, are only generated when the project is already operational. While there are some purchasing programmes where it is possible to receive part of the CER revenue upfront, the dominant market model has so far been “payment on delivery”. Moreover, upfront payment is a tradeoff between receiving early financing and the amount of CDM financing received: since there is always a risk that a project will fail or not generate as many CERs as expected, CERs sold upfront fetch a lower price than issued CERs. The range is currently 8-10 Euros for medium-risk forward sales, 10-13 Euros for low-risk forwards, 10-14 Euros for CERs from registered projects, and 14-16 Euros for issued CERs (GTZ 2008).

The development of a CDM project is connected to high CDM-specific transaction costs for the development of the project design document (PDD), validation, registration, monitoring, verification and certification. These costs may range from several ten to several hundred thousand US\$ (Ecosecurities/UNEP Risoe 2007: 73). Moreover, the larger part of these costs is incurred before the start of the project and thus further exacerbates the upfront financing problem.

The additional CER revenue is subject to high risks. Ex ante, project developers cannot be sure whether their project will be registered, whether it will actually achieve the expected amount of emission reductions and which price they will receive for the CERs. Relying on CER revenues to make an otherwise unprofitable project profitable is therefore a very uncertain proposition.

Moreover, as a result of these risks banks often do not take CER revenues into account when deciding on giving a loan to a CDM project (Ecosecurities/UNEP Risoe 2007: 73). This effectively shuts many project developers out from one of the most important financing options.

For many project types current CER prices are too low to significantly increase profitability. For example, for CO₂-avoiding renewable energy projects the CDM usually increases the internal rate of return (IRR) only by a few percentage points (Willis, Wilder und Curnow 2006).

Moreover, the CDM is designed as a market-based instrument with the purpose to mobilise private investments in emission reduction projects. These naturally concentrate where investment conditions are best, i.e. in countries with huge emission reduction potential and a beneficial investment environment with a stable political and legal system. The four leading countries India, Brazil, China and Mexico account for no less than three quarters of all projects currently in the pipeline while many other countries have so far been completely bypassed (Fenhann and Lema 2008).

The current form of the CDM is also being criticised for being fundamentally ill-suited for many types of renewable energy and energy efficiency projects because activities in these areas are often of a dispersed nature, have relatively high transaction costs and yield relatively low CER volumes. Their potential can therefore hardly be captured by the traditional single-site approach of the CDM (Figueres et al. 2005: 4). This is even more true in the case of the transport sector. Transport emissions usually stem from a large number of small mobile sources and traffic growth depends on a variety of external factors. Even if reliable data is available, which is doubtful for many Southern countries, establishing a project's baseline and accurately monitoring its emissions pose enormous challenges. Moreover, transport projects usually serve a variety of objectives, which makes it difficult to establish that a project would not have taken place without the CDM (Browne et al. 2005; Wittneben et al. 2008).

To help tap into dispersed emission reduction potential, the new project type of Programmes of Activities (PoA) was developed. It allows the aggregation of decentralised activities under the coordination of one central actor. Since the final rules for the implementation of PoAs were agreed only in 2007 (UNFCCC 2007b), it remains to be tested whether this approach does indeed offer better prospects for decentralised small-scale activities.

2.2 Doubts about the Environmental Integrity of the CDM

One crucial feature of the CDM is that it generates new certificates (based on GHG emission reductions or biomass carbon sequestration) which are added to the overall GHG "budget" established by the Kyoto Protocol for industrialised countries. This necessitates the requirement to ensure that each CER is in fact backed up by a genuine tonne of CO₂ equivalent (CO₂-eq.) of emissions reduced, or removed from the atmosphere and sequestered. In the parlance of the climate regime, the emission reduction or carbon sequestration needs to be "additional" to what would have happened in the absence of the project activity. If CERs were awarded in error, they would allow emissions in industrialised countries to rise but without a corresponding emission reduction in developing countries, which means that global emissions would rise because of the CDM project activity.

Recently, the additionality of many projects has been called into question. For example, a survey by Axel Michaelowa, a member of the CDM Registration and Issuance Team, and Pallov Purohit of 52 CDM projects registered in India by May 2006 found significant deficiencies as regards the demonstration of additionality

by the project developers and the evaluation of the projects by the validators (Michaelowa and Purohit 2007). Lambert Schneider, a member of the CDM Methodologies Panel, recently estimated that additionality is unlikely or questionable for up to 40% of the projects registered so far, accounting for about 20% of expected CERs (Schneider 2007). Given the currently expected volume of 2.5 billion CERs by 2012, the CDM could thus severely undermine the environmental effectiveness of the Kyoto Protocol.

The CDM Executive Board has over the years significantly strengthened the regulatory basis for additionality testing as well as its own capacity to assess project. In 2006, it established a Registration and Issuance Team, which assesses the documentation of each request for registration. Moreover, in 2007 the UNFCCC secretariat started to assess each project in addition to the RIT. The Executive Board is currently working on a Validation and Verification Manual (VVM) to further improve its guidance on how validators should assess projects.

However, the difficulty is not only the implementation of the additionality concept but there are also fundamental problems. The baseline-and-credit approach measures projects based on assumptions about what would have happened in the future under “business as usual” conditions, which is by definition hypothetical. In essence, it is not logically possible to prove a negative, i.e. that something would not have happened without the CDM. The only exceptions are project types such as HFC projects where the CDM provides the only revenue stream and is therefore the only reason to undertake a project. Moreover, external validators are always at an information disadvantage against project developers, and indicators used to determine additionality such as the IRR can be easily manipulated by modifying project assumptions such as the discount rate and capacity factor.

One possibility to address the additionality problem would be to discount CERs, i.e. not to issue one CER per tonne of emissions reduced but for example one CER for every two tonnes reduced. The problem with this approach is that it would hurt the truly additional projects, which actually do depend on the CER revenue to become viable. By contrast, non-additional projects would only have their windfall profits reduced and could still be brought forward. Discounting is therefore a possibility to address the additionality problem at the aggregate level for the mechanism as a whole: if one estimates that x% of all CERs are not additional, one could discount CERs by that percentage. But discounting is not an instrument to screen out individual non-additional projects.

Another option is to shift the methodologies for baseline development and additionality testing from bottom-up to top-down approaches based on objective criteria such as technology penetration rates or benchmarks where this is possible, e.g. in terms of kilogrammes of emissions per tonne of product produced. The criteria could be set below BAU levels to cancel out non-additional reductions from activities that would have taken place anyway, with or without the CDM.

The EB has moved in this direction with the approval of methodology ACM 0013 for highly efficient fossil-fuel fired power plants. This methodology establishes the baseline establishing a benchmark which is based on the 15% most efficient plants in the host country using the same fossil fuel. Moreover, the benchmark includes CDM projects, so that the project type phases itself out over time in a country as the technology becomes common practice through the CDM (UNFCCC 2007c).

Since CDM methodology development is a bottom-up process where the EB cannot develop methodologies by itself but only react to methodology proposals submitted by project participants, this approach can for the moment be developed further only as far as appropriate methodologies are submitted to the EB.

However, it bears reiterating that no approach to demonstrating additionality can ever be perfect since it will always rest on hypothetical assumptions about what would have happened under “business as usual”. Regulating additionality testing is therefore always a balancing act between accepting non-additional projects and shutting out truly additional projects. Where this balance should be struck is a policy decision. Also, defining appropriate thresholds for benchmarks and penetration rates would be a complex challenge since it would need to take into account the specific circumstances of a technology, country and sector.

2.3 Doubts About the Contribution to Sustainable Development

According to Art. 12 of the Kyoto Protocol, the first goal of the CDM is to advance sustainable development in the host countries. This is even more critical when considering that emission reductions or carbon sequestration achieved by CDM projects are not intended to globally lower GHG emissions but to offset emissions of industrialised countries. Critics claim that the CDM is failing to meet its sustainable development goal and give a variety of reasons.

Starting with the CDM regulations, the modalities and procedures adopted at Marrakesh establish that while the economic and technical data of the CDM projects are examined in much detail internationally, the assessment of a project’s impact on local environmental and social conditions is entirely at the discretion of the host country government (Decision 17/CP.7). Moreover, the process does not include a formal way to support host countries in the formulation, monitoring and enforcement of sustainable development criteria. Especially non-governmental organisations have voiced concerns that these criteria are in many cases very weak, if they exist at all. In practice, it cannot be observed that host countries reject projects for the reason of lacking sustainable development benefits. Critics also complain that in many cases there is next to no possibility for local stakeholders to be meaningfully involved in the approval process, leading to projects which disregard or actually violate their needs (e.g. Lohmann 2006, Schneider 2007).

Moreover, the CDM gives a monetary value only to a project’s emission reductions but not to other positive environmental or social benefits it may deliver. Projects with large sustainable development benefits but higher abatement costs may therefore be crowded out of the market.

One attempt to improve the incentives for projects with clear sustainable development benefits has been the development of the CDM Gold Standard. It was developed by an international expert panel at the initiative of the World Wide Fund for Nature (WWF) and supported inter alia by the German government. It defines quality standards that exceed those laid down in the Kyoto Protocol and the Marrakesh Accords, hoping that buyers will be willing to pay a higher price for CERs from certified high-quality projects. The Gold Standard is supposed to thus also reward non-climate sustainability benefits and in this way promote high quality projects.

However, project developers and buyers have so far not shown very much interest in the CDM Gold Standard. At the conference “Climate Protection as Development Opportunity” organised by the Hamburg Institute of International Economics in June 2004, representatives from state purchasing programmes and private businesses explicitly stated that the Gold Standard was not of interest to them since they primarily aimed at procuring as many CERs at as low a price as possible (Michaelowa 2004). Unsurprisingly therefore, there are currently only 11 registered Gold Standard projects, with another 35 in the pipeline (Gold Standard 2008: 5).

Moreover, even if projects with clear sustainable development benefits are feasible, under the project-based approach they nevertheless remain only isolated local efforts with limited transformational effect (Figueres 2005: 5f). As a consequence, some critics have claimed that the CDM in its current design as a market-based mechanism, which primarily focuses on generating CERs within local projects, is fundamentally incapable of making a substantial contribution to sustainable development (Pearson 2004).

3 What and Who Needs to be Incentivised?

Discussions about the further development of emissions trading after 2012 should be guided by an understanding of how emission reduction options are structured and who are the actors that would need to make investment decisions. These factors vary from sector to sector and partly also from country to country. The following therefore briefly discusses some main mitigation options (largely based on IPCC 2007a), though without a claim to being comprehensive.

In the area of “traditional” energy supply from large power plants investments are primarily made by state or private power utilities. In many Southern countries the power sector is still organised as a state monopoly, allowing for direct intervention by government. Mitigation options are improvements in generation efficiency, reduction of distribution losses, combined heat and power, fuel switch, and carbon capture and storage. Especially for the latter two options the internationalisation of costs through emissions trading or taxes can create important incentives. Efficiency improvements, however, are often not being made even where they would be self-financing. Reasons are non-economic barriers such as lack of information or difficulties in raising the necessary capital. Further improvement of profitability by carbon pricing does therefore not necessarily attack the root of the problem.

Renewable energy applications by contrast (except for large hydropower) are so far strongly being developed by small and medium enterprises. Open access to the grid for these actors is one of the main success factors of the German feed-in system. In Southern countries, however, independent providers are often shut out by state monopolies. Moreover, for many projects current CER prices are too low to significantly improve profitability (see above).

In the industry sector one needs to distinguish between emissions of CO₂ and other GHGs. The development of the CDM has shown that reductions of the highly potent GHGs can be well tapped through emissions trading. Reductions of CO₂ emissions, by contrast, require incremental process and energy efficiency improvements, raising again the problem of non-economic barriers.

In the residential, commerce and service sectors there is massive emission reduction potential through energetic renovation of buildings and introduction of energy efficient heating, lighting and electric appliances. Investors are mainly the private building owners and the users of electric appliances. The massive efficiency potential is not being used for a variety of reasons such as lack of information or capital or the principal-agent problem: when renovating a building the energy cost savings accrue to the lessees but the costs are borne by the lessor. Efficiency improvements can therefore often be best achieved through government measures and regulations such as building codes which remove these barriers. Unsurprisingly, therefore, the CDM has so far had very little success in this area. Out of the currently 3,324 projects that have been registered or are at validation, only nine address energy efficiency in households (Fenhann and Lema 2008).

For the transport sector one can distinguish between investments in transport infrastructure and investments in vehicles. Infrastructure investments are usually a task of governments, as are investments in vehicles for public transport. Investments in vehicles for private transport are made by the users. Emission reduction options are introduction of more efficient vehicles, changes in driving behaviour and shifting from individual to public and from motorised to non-motorised transport. Spatial planning also has a central role: dense settlement structures with short distances between places for living, working and leisure minimises transport needs and thus CO₂ emissions. As noted above, the fact that transport emissions stem from huge numbers of small mobile emission sources makes quantifying emissions especially difficult. Partly for this reason, the transport sector has so far also seen very little CDM activity. There are currently six projects already registered or at validation (Fenhann and Lema 2008).

Options in agriculture are changed crop and land management to increase soil carbon storage, restoration of cultivated peaty soils and degraded lands, improved techniques for rice cultivation and livestock management to reduce methane emissions and improved nitrogen fertiliser application. Options in the forestry sector are afforestation, reforestation and reducing deforestation. Especially reducing deforestation is a highly complex challenge requiring to address the underlying drivers such as pressure to exploit mineral resources or to cultivate new land to raise cash crops such as soy or biofuels. The quantification of forestry emissions and reductions has proven to be highly complex. As a consequence there are so far only 18 afforestation/reforestation projects in the CDM pipeline (Fenhann and Lema 2008).

Main options in the waste sector are methane recovery from landfills, waste incineration with energy recovery, composting of organic waste, controlled wastewater treatment, recycling and waste minimisation. The CDM has so far tapped especially successfully into the methane-related reduction options such as landfill recovery. Since methane is 21 times as potent a GHG as CO₂, methane projects receive high numbers of CERs, which makes projects highly profitable. The CDM pipeline has no less than 267 landfill gas projects at least at validation (Fenhann and Lema 2008).

Looking at the sectors, one can therefore draw a basic distinction: reduction options at large installations such as in the energy and industry sectors can be tapped into relatively easily by emissions trading. Not by chance these are exactly the sectors covered by the EU emissions trading scheme (EU ETS). By contrast, other reduction activities such as in the renewable energy, buildings and transport sectors are not only often decentralised and of a small scale, which makes quantifying emission reductions more difficult, but also impeded by a variety of non-economic barriers. Carbon pricing can therefore be one element of a climate protection strategy, but it needs to be accompanied by domestic policies and measures (PAMs) that help to remove non-economic barriers.

This raises the question how Southern countries can be moved to implement such PAMs, especially where they entail higher costs than business as usual development. Sectoral approaches have been discussed as one means to incentivise climate-friendly PAMs.

4 Defining Sectoral Approaches

Sectoral approaches have lately received much attention in the hope that they will be able to deal with some of the shortcomings of the current CDM and allow for larger-scale emission reductions. However, a wide variety of concepts and definitions has emerged, with some concepts being the same as others but using a different label, and others using the same labels but referring to different concepts, for example:

- Samaniago and Figueres (2002) suggested a government-driven mechanism that would enable developing countries to develop national or local policy initiatives that discernibly lower GHG emissions in a particular sector. In this approach, the CERs are supposed to flow directly to the host government that will thus be compensated for its efforts and may choose to pass some of the benefits on to industry and households affected by the measures. Measures that might be implemented under such an approach might for example be a feed-in law for electricity from renewable energy sources or a mandatory fuel efficiency standard for cars.
- By contrast, Cosbey et al. (2005) labelled this approach “policy-based” and defined a “sectoral CDM” as a mechanism driven by private actors to combine similar projects within a country or local region along the lines of a sector. This approach is essentially akin to project bundling, which had already been allowed for small-scale CDM projects at that time. A hypothetical example could be the upgrading of all gas-fired power plants in a country to combined cycles.
- Bodansky et al. (2004) discussed a “programmatically crediting mechanism” that might encompass both public and private actors. This term was taken up by Figueres et al. (2005) who defined programmatic project activities as a multitude of actions that occur as the result of a deliberate programme, which can either be a voluntary or mandatory government measure or a private sector initiative and is coordinated by one enacting agent. In essence, this type is a project bundle with one central actor who provides an incentive. This approach was finally included under the CDM by the first COP serving as Meeting of the Parties to the Kyoto Protocol (CMP) in Montreal in December 2005.
- Bosi and Ellis (2005) (developed further in Baron and Ellis, 2006) proposed the introduction of sectoral crediting mechanisms. These would essentially consist of baselines decoupled from individual activities. Instead, the overall sectoral emission mitigation below the sectoral baseline would be credited. Such a mechanism could be implemented at the government level or might be devolved to the private entities in the respective sector. They propose three options for setting sectoral baselines: absolute sectoral emissions targets, relative sectoral emissions targets (e.g. in terms of emissions per unit of output) or policy-based baselines. The latter is akin to the original proposal for a “sectoral CDM” by Samaniago and Figueres (2002). An example of a sectoral emission target would be to define a cap for emissions from the power sector, which could then be devolved to the individual power utilities in a

domestic cap-and-trade emission trading system. As they envisage it, such a mechanism would probably run in parallel to rather than be incorporated into the CDM.

Based on these discussions, five basic types of mechanisms or proposed mechanisms can be distinguished, as illustrated in Table 2.

Table 2: Types of Mechanisms

| | What | Who | Scope |
|---|---|---------------------------------|-----------------------------|
| Bottom-Up Activity Crediting | Crediting of specific individual projects – “classic” and programmatic CDM | Private entities, (governments) | Local or regional |
| Top-down/Sectoral Activity Crediting | Aggregation of many/all possible activities in a sector, initiated by political or similar actor – in principle possible under programmatic CDM | Private entities, governments | Local / regional / sectoral |
| Benchmark Activity Crediting | Setting of a benchmark for a sector or sub-sector in a country, e.g. for emissions per tonne of cement production; facilities that stay below the benchmark receive credits – in principle possible under current CDM | Private entities, governments | Regional/sectoral |
| Policy Crediting | Crediting of specific policies that reduce emissions below business as usual – not possible under current CDM | Governments, private entities? | Regional / sectoral |
| Sectoral/Target-Based Crediting | Decoupled from specific activities or policies, credits are awarded if emissions from a sector are kept below a pre-defined level – not possible under current CDM | Governments, private entities? | Regional / sectoral |

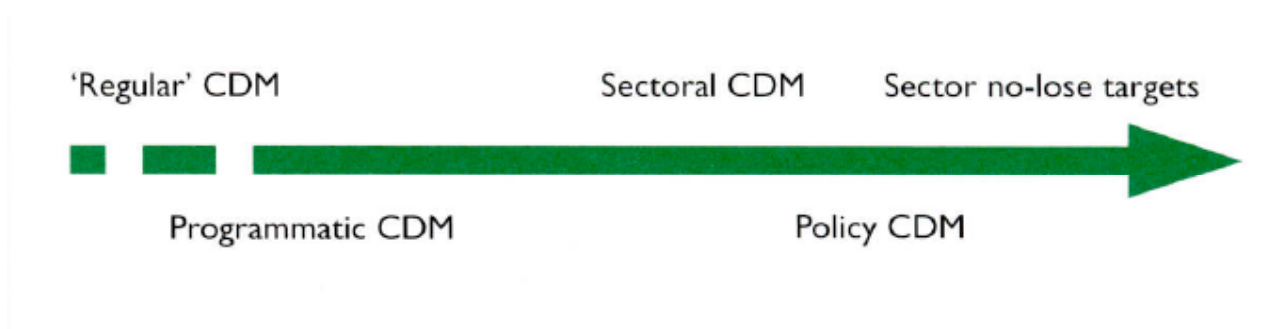
A basic distinction can be made between approaches which retain the activity-based character of the CDM but use sectoral instruments, namely programmatic CDM and benchmarking, and “real” sectoral approaches moving away from granting credits to particular activities, namely policy and sectoral/target-based crediting. These “real” sectoral approaches would only become possible if the current CDM rules were changed.

It has to be noted that these types are ideal types while in practice there are significant overlaps. For example, programmatic projects may implement policies, measures and stated goals if there are barriers to their implementation (UNFCCC 2007b), so there is an overlap with policy crediting. Moreover, sectoral/target-based approaches would effectively only lead to emission reductions if they move Southern governments to introduce climate protection PAMs. The main difference between policy-based and sectoral/target-based crediting is therefore that the former would evaluate individual policies whereas the latter would assess the performance of a sector as a whole and multiply policies or other measures could be introduced to reduce emissions below the baseline.

The discussion about sectoral crediting also overlaps with discussions about the adoption of sectoral targets for developing countries, especially when discussed in the form of *voluntary targets* or *“no-lose” targets* (e.g. Philibert 2000). Voluntary targets would function like the CDM in the sense that credits would be awarded if emissions are kept below a certain pre-agreed level, but no penalties would be applied if the target was not kept. The target could be set below BAU so that the country would first have to make a contribution to climate protection from its own resources before it could profit from the sale of credits. The next evolution could then be the shift from baseline-and-credit to cap-and-trade emissions trading with binding sectoral or national targets.

What is being discussed can therefore be seen as a continuum of ever more comprehensive and stringent emission trading approaches rather than alternative proposals, as illustrated in Figure 1.

Figure 1: Options for Scaling Up the CDM



Source: Jung, Höhne 2007

The distinction between sectoral crediting and sectoral no-lose targets may be rather academic, however. In practice, one could as well design one mechanism where in some cases, for example for more advanced developing countries, the baseline could be set below BAU, whereas in other cases the baseline would be set at BAU.

Since all activity-based approaches are in principle possible under the current CDM, the following discussion will focus on the proposals for “real” sectoral approaches that would entail significant changes to the mechanism, namely sectoral/target-based and policy-based crediting.

5 Potential Advantages and Disadvantages of Sectoral Approaches

This section will examine in how far sectoral approaches show potential to improve the main weaknesses of the current CDM as discussed above, namely the limitations to the incentive, the questions of environmental integrity and the contribution to sustainable development. It emerges that the implications of sectoral/target-based and policy-based crediting are mainly the same. The only (yet crucially important) exception is the question of environmental integrity since the two approaches entail differences in baseline setting and monitoring.

5.1 Incentives for Reducing Emissions

5.1.1 Incentives for Sectoral Transformation

Sectoral approaches would by definition set incentives for sector-wide transformations in Southern countries. Sectoral approaches that lead to the introduction of new PAMs might specifically give a major boost to decentralised small-scale renewable energy and energy efficiency activities (Figueres et al. 2005: 4f). A sectoral approach might also be a way to include activities which have beneficial development aspects but are on their own not cost-effective enough for the CDM. The boundary could be drawn in such a way that the scheme would contain components with both low and high abatement costs, so that the overall price of the CERs would be competitive. A sectoral approach might even be a way to finally be able to address transport. Browne et al (2005: 64-66) argue that a sectoral approach would make it possible to implement, for example, fuel efficiency standards or comprehensive traffic management as CDM projects.

5.1.2 Incentives for Whom?

However, policy- and sectoral/target-based approaches raise the question of who receives the incentive. Since these mechanisms would operate at the government level, these approaches would introduce an intermediary (the Southern governments) between the carbon market and those who actually undertake the investments.

However, as discussed above, the carbon market has difficulties in reaching the building, transport and to some extent also the renewable energy sector anyway. From this perspective, sectoral approaches could potentially provide the necessary stimulus for Southern governments to introduce PAMs to redirect investments in these sectors. For example, a Southern government could introduce a feed-in tariff for renewable energy providers and finance the tariff through the revenue it receives for the emission reductions.

For the energy and industry sectors, sectoral schemes could potentially immediately be devolved to the entity level through a domestic emission trading scheme (ETS). This approach would obviously work best if Southern governments assumed binding sectoral targets. But even voluntary targets could conceivably be devolved in this manner, especially if a domestic ETS is modelled on Canada's plans for a domestic Canadian ETS. The Canadian system would operate not on a cap-and-trade but on a baseline-and-credit basis. Truing up would occur annually, with companies remaining below their targets obtaining credits, whereas companies staying above their targets would have to surrender additional emission certificates to cover their surplus emissions (Government of Canada 2008). In the CDM context, the obligation for companies to purchase emission certificates if the target is not met could be omitted. This approach would essentially be akin to a comprehensive introduction of benchmarks for the energy and industry sectors of a country, with installations that stay below their benchmark being able to receive credits.

Another question is which countries would actually be able to make use of sectoral approaches. On the one hand, poorer countries might find it easier and cheaper to implement PAMs than to try to attract individual investment projects (Environmental Defence 2007: 6; Sugiyama, Yamaguchi & Yamagata 2005: 16). On the other hand, given the amounts of technical capacity and data required, it can be expected that only the most advanced Southern countries would be able to make sectoral approaches work. Introducing sectoral ap-

proaches therefore raises the prospect of exacerbating the current geographical imbalance of CDM projects even further.

5.1.3 Strength of the Incentive – Result of Supply and Demand

A further question is how strong the provided incentive would be, i.e. what would be the balance between the additional revenues, the costs, and the risks of not receiving the estimated revenue that is inherent in the carbon market.

The revenue is determined by the price, which is determined by the ratio of supply and demand. The demand is set politically by the stringency of the industrialised countries' emission targets and the extent to which they want to meet these targets through purchases instead of domestic action. The potential supply of emission reductions in Southern countries is massive.

A recent project by Ecofys and the Wuppertal Institute analysed the reduction potential in six major emerging economies, Brazil, China, India, Mexico, South Africa and South Korea. The study found that all six countries possess massive mitigation potential: In the BAU scenario, the combined emissions of all six countries in 2020 amount to 18.4 Gt CO₂-eq. This compares with 16.8 Gt in the 'no regrets' scenario, 15.6 Gt in a scenario including low-cost mitigation options that offer additional benefits such as improved air quality ('co-benefit scenario'), and as little as 12.6 Gt in the ambitious scenario – more than 30 percent lower than BAU emissions.

Furthermore, the study estimated the emission reductions that would be needed to keep the global average temperature rise below 2° Celsius, as aimed for by the EU. The estimate initially assumed that the industrialised nations will reduce their domestic emissions by 30 percent by 2020 compared with 1990 levels, i.e. without purchasing emission reduction units from Southern countries. In this case, to stop an overall rise in global emissions during the coming decade, as called for by the Intergovernmental Panel on Climate Change (IPCC), nearly all the 'ambitious' potential would have to be mobilised in the emerging economies. In all other scenarios, global emissions would continue to rise (Höhne et al. 2008: 128-130). This assessment matches with the fourth assessment report of the IPCC, according to which stabilisation of GHG concentrations at 450 ppm, the lowest stabilisation scenario assessed by the IPCC so far, requires domestic reductions by industrialised countries in the range of 25-40%, plus a "substantial deviation" from business-as-usual in Southern countries (IPCC 2007b: 776).

The project assumed that the Southern countries would mobilise the co-benefit potential, i.e. 2.8 Gt CO₂-eq., as their own contribution. This would leave 2.9 Gt CO₂-eq. to be supported by industrialised countries. Delivering this support mainly through the carbon market would result in a zero net effect for the atmosphere since it would allow industrialised countries emissions to be 2.9 Gt CO₂-eq. above target. Reaching the 2°C target would hence require reduction targets for the industrialised countries to be correspondingly more stringent, which would be significantly more stringent than is currently being discussed.

It also bears noticing that sectoral approaches would still retain the limitations of the current CDM in terms of receiving the revenue only ex-post and not being able to predict accurately how much revenue will be received. Southern countries would therefore need to prefinance sectoral schemes and run the risk of not being able to recoup their costs. These limitations could probably only be ameliorated if industrialised countries were willing to finance a significant part of the costs upfront.

5.2 Environmental integrity

5.2.1 Feasibility of Quantifying Reductions at the Sectoral Level

Sectoral/target-based and policy-based crediting imply to establish the baseline and additionality at an aggregate level instead of for specific activities. They would thus have the advantage of removing the necessity to determine the additionality of individual investment decisions, which is in the final analysis not logically possible for most cases. However, sectoral approaches also pose new challenges for baseline-setting and additionality-testing. The challenge is particularly complex with regard to policy-based crediting.

In order to prevent situations where Southern countries hesitate to introduce climate-friendly policies in order not to render CDM projects non-additional, the CDM Executive Board has decided that the baseline of projects may be based on a hypothetical scenario without the policy (UNFCCC 2004). In line with this decision, the baseline of a policy-based scheme might be defined as the situation without the policy.

But what would additionality mean for policy-based schemes? Several aspects appear to be problematic:

- Would a government have to prove that it is adopting a policy solely because of climate change considerations? Would this even be possible given that policies are usually introduced for a variety of reasons and that GHG emission reduction policies usually entail a number of benefits, such as reduction of pollutant emissions, technology promotion, decreased dependence on fossil fuel imports etc.?
- It would also be very difficult to determine for how long a policy would not have been implemented in the absence of the CDM.
- Moreover, baselines and additionality testing would need to be dynamic since for example an efficiency standard may be very stringent at the time of introduction but over time it will become common practice.
- Furthermore, it may in many cases be impossible to establish a direct link between a policy and the climate benefit achieved since policies typically intervene in complex environments where many factors come into play. If a government, for example, introduces vehicle fuel efficiency standards and consequently a drop in transport emissions is measured, it would be necessary to differentiate to what extent this drop has been a result of the government policy and to what extent it has been due to other factors such as rising fuel prices.

The sector/target-based approach removes this difficulty by simply assessing the performance of a sector as a whole instead of trying to evaluate individual activities or policies.

However, the quantification of emissions and reductions for both, policy- and sector/target-based approaches, would have to rely on modelling and projections, which always possess a degree of uncertainty. Projections at an aggregate level may therefore be more reliable than project-by-project additionality testing, but they might be even more unreliable. It is therefore imperative to assess the reliability of quantifying developing country reductions at the sectoral level before scaling up uncapped trading.

In any case, establishing a robust baseline at the sectoral level would necessitate having detailed and reliable emission inventories and projections for the host countries or at least for the sectors covered. The reliability of the emissions monitoring would also need to be ensured. At the moment, probably only a few, if any, Southern countries dispose of the necessary technical capacity. The introduction of the EU emissions trading

system has highlighted the significant challenges connected to obtaining reliable data. Sectoral approaches would therefore require significant capacity building.

If the amount of emission reductions cannot be quantified to a sufficient degree of accuracy, an option to remedy this problem might be to set an especially stringent baseline low enough to ensure that no business-as-usual emission abatement is credited (Bosi and Ellis 2005: 19-21). A further option is to discount the emission reductions as already discussed above. However, apart from potentially making truly additional measures unviable, this approach also implies a message that emission reductions from Southern countries are worth less than emission reductions in industrialised countries, which may be politically difficult to communicate.

Another aspect is who should approve sectoral schemes. Arguably, at the moment neither the EB nor the CMP would dispose of the technical capacity necessary to assess sectoral schemes. Introducing sectoral schemes would therefore require either strengthening the capacity of the EB or establishing a separate body dedicated to approving sectoral schemes.

5.2.2 Relationship to the Project-Based CDM and Double Counting

Sectoral approaches should in principle be able to complement rather than replace the current CDM. Nevertheless, there are some issues that would have to be resolved: what would happen if an already existing local CDM project was encompassed in or connected to a new sectoral scheme or, alternatively, if a project developer intended to develop a local project that would be directly or indirectly connected to an already existing sectoral scheme? The most important issue here is double counting: if the local project received CERs for the climate benefit it has achieved and the sectoral scheme also received CERs for the contribution made by the local project, one and the same emission reduction would in effect be counted twice.

One solution would be to deduct the number of CERs issued to the local project from the amount of CERs issued to the sectoral scheme. Another option would be to prohibit the implementation of such local projects. However, this seems unduly restrictive and another solution would still need to be found for the local projects that are already in place when a sectoral scheme is launched. Given the thousands of CDM projects now in the pipeline, a very high number of projects could be thus affected.

In addition, since most economic segments are interlinked, the double counting problem might also arise if there was more than one sectoral scheme in a country. One hypothetical example would be to conduct one sectoral scheme that introduces energy efficient electric appliances in households and another scheme addressing the electricity sector. These two sectoral schemes are clearly linked, in effect, the household scheme would help the electricity sector to reduce its emissions. Emission reduction credits awarded to the household scheme would therefore need to be deducted from those awarded to the electricity sector. The linkages between schemes would need to be examined for each particular case.

5.3 Sustainable Development

When applied to sectors such as transport and buildings, where the current CDM has so far had difficulties to reach, sectoral approaches could not only unlock new emission reduction potential but also better promote sustainable development more generally. Investments in transport and buildings are key for economic development and meeting basic human needs such as mobility, adequate housing and access to basic energy services.

However, many of the criticisms directed against the current CDM are irrespective of the scale at which projects are implemented. In particular, sectoral approaches would not address the problems that have been noted with regard to the assessment of a project's impact on local environmental and social conditions and the limited possibilities for local stakeholders to be meaningfully involved in the approval process. These issues are independent of the types of projects that are proposed but would have to be addressed by other means such as capacity building and the elaboration of international guidelines for assessing sustainable development impacts and taking account of potential environmental and social problems and stakeholder comments. These guidelines could be formulated as requirements that need to be assessed during validation and verification. However, prior to COP 7 at Marrakesh the EU did make proposals along those lines but they were rejected by developing countries who argued that international oversight would impinge on their sovereignty.

Sectoral approaches would also not change the fundamental design of the current CDM, which rewards only projects' climate benefit but not the positive impact it may have on sustainable development. This problem could be ameliorated if there was a wider sense on the buyer side that activities with multiple sustainable development benefits are of a higher quality than activities whose only impact is to reduce emissions, and a corresponding willingness to pay premium prices for emission reductions from such activities. However, as noted above, this is exactly the approach taken by the Gold Standard and so far it has not been very widely adopted.

Another possibility would be to discount emission reductions from activities with little or no sustainable development benefits. However, it can be expected that every country would have different positions on which activities should receive full crediting and there are also countries such as Japan which have a firm position that no technologies should be discriminated against. Prior to COP 7, the EU did propose a 'positive list' of CDM project types, but it was not possible to achieve international agreement.

6 Sectoral Approaches and the Overall Climate Regime

As noted above, the sectoral approaches that are being discussed represent a continuum of ever more comprehensive and stringent emission trading approaches. Politically, this continuum can be seen both positively or negatively. Sectoral approaches may be a way for Southern countries to gradually move towards binding emission limitation commitments. They would stimulate the establishment of the necessary technical capacity and infrastructure such as detailed emission inventories and projections, and let governments gain experience with large-scale climate protection policies. The 'Sao Paulo Proposal' even includes an automatic graduation based on countries' CDM activity: It suggests to establish a global limit on cumulative transfers

of CERs and divide this limit among Southern countries according to each country's population and an index based on the principles of responsibility for causing climate change, capability and potential to mitigate emissions. Once a country has reached its CDM transfer limit, it would automatically graduate to Annex I (BASIC project 2006).

From a purely environmental perspective, the adoption of binding commitments by as many countries as possible is certainly an outcome to aim for. However, Southern negotiators may see sectoral approaches rather as a slippery slope, or even as an instrument intentionally designed to manoeuvre them into adopting binding commitments, which they resist on the basis of the principle of common but differentiated responsibilities and respective capabilities and the principle that industrialised countries should accordingly take the lead in combating climate change, as laid down in Art. 3.1 of the Framework Convention.

Nevertheless, any definition of adequacy in achieving the ultimate objective of the UNFCCC – to prevent dangerous anthropogenic interference with the climate system – will require not only steep cuts in the North but also increased mitigation efforts in the South. As noted above, according to the fourth assessment report of the IPCC, stabilising GHG concentrations at 450 ppm, the lowest stabilisation scenario assessed by the IPCC so far, will require domestic cuts of 25-40% in industrialised countries plus a “substantial deviation” from business as usual development in Southern countries.

Moreover, it is necessary to differentiate among the current non-Annex I countries. Rich oil-exporting countries such as Saudi Arabia, still relatively poor but rapidly industrialising countries such as China and least developed countries such as Burkina Faso have in fact not too much in common with each other. Accordingly, applying the same rules to them under the climate regime does not seem appropriate. A differentiation of rules should be based on a fair process and transparent criteria.

The ‘South-North Dialogue’ (Ott et al. 2004) classified Non-Annex I countries into four groups according to an index based on the criteria responsibility for causing climate change, capability and potential to mitigate emissions (see Annex I for a list of which countries were classified into which groups):

NICs: Newly Industrialised Countries, those with the highest aggregate score index value

RIDCs: Rapidly Industrialising DCs, medium index value; relatively rapid industrial growth in the last decade and relatively high income

LDCs: Least Developed Countries, UN-defined group of countries with low potential, low capability and low responsibility

ODCs: Other developing countries, at a very early stage of industrialisation but not as poor as those countries defined as ‘least developed’

This continuum of countries could then be matched with the continuum of ever more large-scale and stringent emission trading approaches. Table 3 illustrates a hypothetical example how groups of countries and types of emission trading could be matched.

Table 3: Example of Possible Country Groups and Types of Emissions Trading

| Country Group | Type of Emissions Trading |
|----------------------|--|
| NICs | Accession to Annex I, II and Art. 17 emissions trading |
| RIDCs | Voluntary or binding national or sectoral targets where feasible, policy commitments and activity-based CDM in other sectors |
| ODCs | Sectoral crediting where feasible, policy commitments and activity-based CDM in other sectors |
| LDCs | Sectoral crediting if feasible, activity-based CDM |

However, there is a serious obstacle to structuring the post-2012 regime along such lines, namely the timeline. To prevent a gap between commitment periods, the post-2012 negotiations should conclude by the end of 2009, as also aimed for by the decisions taken at COP 13/CMP 3 at Bali in December 2007. Framing the participation of Southern countries in terms of sectoral approaches would require that the rules, countries/sectors covered and Southern countries' levels of ambition would also be agreed on by the end of 2009. Determining Southern countries' levels of ambition would in turn require establishing their baselines, which would in turn require the existence of robust emission inventories and projections. It can be assumed that for most Southern countries the necessary data does not exist at the moment and that it will not be possible to gather the data by the end of 2009.

It may therefore be necessary to initially frame the post-2012 participation from Southern countries in terms of commitments to certain policies and measures, such as improvement of energy efficiency, promotion of renewable energy, etc., and aim for the graduation to sectoral emissions trading as an option for the medium and longer term.

Due to these difficulties, Jung and Höhne (2007) propose to first start a pilot phase on sectoral approaches to gain experience with developing sectoral baselines and support the necessary data gathering. A similar pilot phase, the Activities Implemented Jointly (AIJ), preceded the inclusion of the CDM and Joint Implementation (JI) in the Kyoto Protocol.

7 Conclusions

7.1 Strengths and Weaknesses of the Current CDM

The CDM has been a mixed success. On the one hand, it has mobilised thousands of projects and billions of investments in a very short timeframe. It has contributed to raising public awareness of the climate problem and in some areas such as HFCs it has achieved a fundamental break of emission trends. In contrast to traditional development financing, Southern actors do not depend on Northern partners but have the possibility to develop projects according to their own priorities.

On the other hand, the CDM has faced serious criticism as to the strength of the incentive it actually provides, its environmental integrity and its contribution to sustainable development. The incentive is limited by the need to prefinance projects, very high CDM-specific transaction costs, the revenue risks inherent to a market-based approach and low prices. Due to its market-based nature, many Southern countries, especially LDCs, hardly benefit from the CDM. Whole sectors such as building and transport have so far hardly been reached by the instrument. As to environmental integrity, there have been strong doubts about the additionality of many projects that have already been registered. Moreover, additionality testing is based on assumptions about what would have happened in the future under “normal” conditions, which is by definition hypothetical. As to sustainability, the assessment of project’s contribution lies solely with the host countries and the national procedures do not necessarily provide space for local stakeholders to be meaningfully involved. Also, the CDM gives a monetary value only to a project’s emission reduction but not to other environmental or social benefits it may deliver. Table 4 summarises the main points of criticism.

Table 4: Weaknesses of the Current CDM

| Strength of Incentive | Environmental Integrity | Sustainable Development |
|---|---|--|
| <ul style="list-style-type: none"> • Need for prefinancing • High transaction costs • Revenue risks • Prices too low for important project categories • Market-based mechanism focuses on emerging economies • Important sectors such as transport, demand-side energy efficiency difficult to address with CDM • No incentive for sectoral transformation | <ul style="list-style-type: none"> • Zero-sum game, CDM reductions “offset” higher emission in industrialised countries • Additionality in most cases difficult if not impossible to prove and validate | <ul style="list-style-type: none"> • Assessment at discretion of host countries, criteria often weak • Often no meaningful involvement of stakeholders • CDM gives monetary value only to emission reductions, not other benefits • Important sectors such as transport, demand-side energy efficiency difficult to address with CDM • No incentive for sectoral transformation |

7.2 Strengths and Weaknesses of Sectoral Approaches

Discussions about the further development of emissions trading after 2012 should be guided by an understanding of how emission reduction options are structured and who are the actors that would need to make investment decisions. Reduction options at large installations in the energy and industry sectors can be tapped into relatively easily by emissions trading. By contrast, other reduction activities for example in the renewable energy, buildings and transport sectors are not only often decentralised and of a small scale, which makes quantifying emission reductions more difficult, but also impeded by a variety of non-economic barriers. Carbon pricing can therefore be one element of a climate protection strategy, but it needs to be accompanied by domestic PAMs that help to remove non-economic barriers.

Sectoral approaches have been discussed as one means to incentivise climate-friendly PAMs and overcome the weaknesses of the current CDM. Various definitions have been proposed, but the two basic forms are a policy-based approach and an approach based on sectoral baselines or targets where the performance of a sector as a whole would be assessed.

Table 5 provides an overview of strengths and weaknesses of these approaches.

Sectoral approaches would by definition be better suited to achieving sector-wide transformations and might in particular give a boost to small-scale decentralised renewable energy, energy efficiency and transport projects. They would also remove the necessity of testing additionality on a project-by-project basis. However, additionality testing as well as monitoring can be expected to be even more complex for policies than for local projects. The sector/target-based approach removes this difficulty by simply assessing the performance of a sector as a whole instead of trying to evaluate individual activities or policies.

However, the quantification of emissions and reductions for sectoral approaches would have to rely on modeling and projections, which always possess a degree of uncertainty. Projections at an aggregate level may therefore be more reliable than project-by-project additionality testing, but they might be even more unreliable. It is therefore imperative to assess the reliability of quantifying developing country reductions at the sectoral level before scaling up uncapped trading.

In any case, establishing a robust baseline at the sectoral level would necessitate having detailed and reliable emission inventories and projections for the host countries or at least for the respective sectors. The reliability of the emissions monitoring would also need to be ensured. At the moment, probably only a few, if any, Southern countries dispose of the necessary technical capacity. Sectoral approaches would therefore require significant capacity building.

Another aspect is who should approve the designs and monitoring reports of sectoral schemes. Arguably, at the moment neither the EB nor the CMP would dispose of the technical capacity necessary to assess sectoral schemes. Introducing sectoral schemes would therefore require either strengthening the capacity of the EB or establishing a separate body dedicated to approving sectoral schemes.

Table 5: Strengths and Weaknesses of Sectoral Approaches

| | Strength of Incentive | Environmental Integrity | Sustainable Development |
|---------------------------------|---|--|---|
| Policy Crediting | <ul style="list-style-type: none"> + Incentives for Sector-Wide Transformation + Incentive for Southern governments to introduce climate-friendly PAMs · Incentives need to be passed through to investors, through domestic ETS or other means · Probably only applicable to most advanced Southern countries · Strength of incentive crucially depends on supply-demand ratio, i.e. stringency of targets for industrialised countries · Revenue still only ex-post and uncertain, may be ameliorated through upfront financing from industrialised countries | <ul style="list-style-type: none"> + Remove need for project-by-project additionality testing · Additionality testing for policies potentially unviable · Need to differentiate between impact of policy and other factors · Quantification would rely on projections and modelling, which possess degree of uncertainty · Need for substantial amount of reliable data | <ul style="list-style-type: none"> + May allow to better address sectors with potentially high benefits such as transport and end-use energy efficiency · Weaknesses regarding criteria for sustainability testing and stakeholder involvement same as in current CDM if not changed generally · Reward still only for emission reductions, not other benefits |
| Sectoral/Target-Based Crediting | <ul style="list-style-type: none"> + Incentives for Sector-Wide Transformation + Incentive for Southern governments to introduce climate-friendly PAMs · Incentives need to be passed through to investors, through domestic ETS or other means · Probably only applicable to most advanced Southern countries · Strength of incentive crucially depends on supply-demand ratio, i.e. stringency of targets for industrialised countries · Revenue still only ex-post and uncertain, may be ameliorated through upfront financing from industrialised countries | <ul style="list-style-type: none"> + Remove need for project-by-project additionality testing · Quantification would rely on projections and modelling, which possess degree of uncertainty · Need for substantial amount of reliable data | <ul style="list-style-type: none"> + May allow to better address sectors with potentially high benefits such as transport and end-use energy efficiency · Weaknesses regarding criteria for sustainability testing and stakeholder involvement same as in current CDM if not changed generally · Reward still only for emission reductions, not other benefits |

Since policy- and sectoral/target-based approaches would operate at the government level, these approaches would introduce an intermediary (the Southern governments) between the carbon market and those who actually undertake the investments. However, as the carbon market has difficulties in reaching some sectors such as the building or transport sector anyway, sectoral approaches could potentially provide the necessary stimulus for Southern governments to introduce PAMs to redirect investments in these sectors. For the energy and industry sectors, sectoral schemes could potentially immediately be devolved to the entity level through a domestic emission trading system.

The strength of the incentive provided by sectoral approaches would crucially depend on the ratio between demand and supply. The demand is set politically by the targets adopted by industrialised countries. The supply of reductions in Southern countries is potentially massive. If the reductions in Southern countries that are necessary to stop global emissions growth in the next decade were to be mobilised primarily through the carbon market, the targets for industrialised countries would have to be significantly tighter than are currently being discussed. Moreover, sectoral approaches would still retain the limitations of the current CDM in terms of receiving the revenue only ex-post and not being able to predict accurately how much revenue will be received. Southern countries would therefore need to prefinance sectoral schemes and run the risk of not being able to recoup their costs through emissions trading. These limitations could probably only be ameliorated if industrialised countries were willing to finance a significant part of the costs upfront.

As for sustainable development benefits, one has to note that these are not necessarily tied to the level of implementation. Especially the concerns raised about host countries' sustainable development criteria and the lack of possibilities for local stakeholders to be meaningfully involved in the approval process are independent of the types of projects proposed. Also, sectoral approaches would not alter the CDM's basic design of giving a monetary value only a projects' emission reductions but not other sustainability benefits. It would be desirable to internationally agree guidelines for the assessment of sustainable development impacts and the involvement of stakeholders and include these in the validation and registration process. However, Southern countries have in the past rejected such proposals arguing that they would impinge on their sovereign rights.

Sectoral approaches may be a way for Southern countries to gradually move towards emission limitation commitments in the framework of the climate regime. They would stimulate the establishment of the necessary technical capacity and infrastructure such as detailed emission inventories and projections, and let governments gain experience with large-scale climate protection policies.

Southern countries should be differentiated according to transparent and objective criteria such as responsibility for causing climate change, capability and potential to mitigate emissions. Different types of emissions trading could then be matched to categories of countries, with more ambitious and binding types such as voluntary or binding national or sectoral targets being applied by the most advanced Southern countries and less ambitious types being applied by less advanced countries.

However, the post-2012 negotiations should conclude by the end of 2009 and it would in all likelihood not be possible to reach the necessary agreement on the rules, countries/sectors covered and Southern countries' levels of ambition for sectoral approaches in that timeframe, especially due to the amount of data that would be required. Framing the participation of developing countries in terms of sectoral approaches may therefore not be an option for the immediate post-2012 regime. It may instead be necessary to initially frame the post-

2012 contributions from Southern countries in terms of commitments to certain policies and measures and aim for the graduation to sectoral emissions trading as an option for the medium and longer term.

Moreover, it is evident that sectoral approaches should not be seen as a panacea. Given the scale of the challenge, one cannot expect that emissions trading will be able to mobilise all of the financial and technological support Southern countries will need to be able to make the necessary break with current emission trends. Putting a price on GHG emissions may be a necessary but is not a sufficient precondition for climate-friendly development. Investments are usually prevented by a wide variety of economic and non-economic barriers. Price instruments therefore need to be accompanied by an equally wide variety of technology- and sector-specific instruments to overcome all existing barriers. The further development of emissions trading therefore needs to be seen in the broader context of the negotiations under the Bali Roadmap on mitigation, financing and technology cooperation. The challenge is to develop a coherent overall package of mechanisms for financial and technological North-South cooperation in the post-2012 framework which as a whole is able to effect the necessary structural changes.

7.3 Recommendations for the Future Development of the CDM

Based on the analysis in this paper, the following recommendations for the future development of the CDM can be derived.

Start pilot phase for sectoral approaches

The discussion about sectoral approaches is still fraught with a high number of uncertainties and being pursued mainly at the theoretical level. It would therefore be useful to start a pilot phase similar to the AIJ phase that preceded the introduction of CDM and JI to test sectoral approaches in practice. In particular the following aspects need further examination in practice:

- The viability of adequately quantifying emissions and reductions at the sectoral level based on projections.
- The viability of adequately demonstrating the additionality of policies and of differentiating the impacts of policies from other factors.
- Which countries and sectors are appropriate for sectoral approaches.
- Mechanisms for passing the incentives from emissions trading on to investors.

Such a pilot phase would also contribute to the establishment of national emission inventories which will in any case be necessary for future more stringent emission control commitments from Southern countries.

Shift activity-based CDM from bottom-up to top-down approaches

Due to the amount of data gathering necessary, sectoral approaches are probably a perspective for the medium rather than for the short term. Moreover, probably only the more advanced Southern countries would be able to make use of sectoral approaches. The activity-based CDM will therefore probably still have a role in the post-2012 regime.

However, the mechanism should be urgently reformed to remedy the deficits that have become apparent as regards its environmental integrity. In particular, methodology development should be shifted from the current bottom-up to a top-down approach based on objective criteria where this is possible such as technology penetration rates and sectoral benchmarks. The EB and its panels should be enabled to develop these methodologies on their own initiative rather than having to wait for proposals from project participants. Defining appropriate thresholds for benchmarks and penetration rates would be a complex challenge since it would need to take into account the specific circumstances of a technology, country and sector. This shift in approach would therefore probably necessitate a further strengthening of the technical capacity at the EB.

However, no approach to demonstrating additionality can ever be perfect since it will always rest on hypothetical assumptions about what would have happened under “business as usual”. Regulating additionality testing is therefore always a balancing act between accepting non-additional projects and shutting out truly additional projects. Where this balance should be struck is a policy decision.

Reopen debate on best approaches to ensuring a contribution to sustainable development

Southern countries have in the past resisted the introduction of mechanisms to assess projects’ contribution to sustainable development at international level. At the same time Southern countries often complain about the lack of sustainable development benefits of the current CDM project portfolio. Southern countries could therefore be asked to make proposals on how the CDM’s contribution to sustainable development could be enhanced.

Moreover, the debate has so far been characterised by a false dichotomy of either full or no regulation at all at international level. Creativity could be invested to find a middle way which could both raise sustainability standards while safeguarding Southern countries’ sovereignty. One idea could be to develop a kind of template for sustainability testing internationally, which Southern countries would then be free to adopt or not, or to adapt to their national circumstances.

It should also be recognised that many Southern countries may not have the necessary capacity to adequately assess projects regarding their contribution to sustainable development. An international process could therefore contribute to enabling host countries to make sure that projects do in fact contribute to their sustainable development.

Create linkages to other discussions on financing and technology cooperation

In parallel to the discussions about the future of the CDM, there is a whole set of negotiations under the Bali Roadmap on mechanisms for financing and technology cooperation. The improvement of the existing financial mechanisms under the Global Environment Facility is being discussed and new international funds are being proposed. It would be highly advisable to strive for coherence between these negotiations. Each instrument has its own strengths and weaknesses. Mechanisms should therefore be designed to complement each other and cover the whole chain from technology development and demonstration to commercialisation and dissemination.

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Annex 1: Groups of Countries According to the South-North Dialogue Proposal

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| NICs: | Bahrain, Brunei, Cuba, Israel, Kazakhstan, Korea (South), Kuwait, Qatar, Saudi Arabia, Singapore, Suriname, Trinidad & Tobago, Turkmenistan, United Arab Emirates, Uzbekistan. |
| RIDCs: | Algeria, Antigua & Barbuda, Argentina, Bahamas, Barbados, Belize, Bosnia & Herzegovina, Botswana, Brazil, Chile, China, Colombia, Costa Rica, Cyprus, Dominican Republic, El Salvador, Fiji, Grenada, Guyana, Iran, Jordan, Lebanon, Malaysia, Malta, Mauritius, Mexico, Oman, Panama, Peru, Philippines, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & Grenadines, South Africa, Thailand, Tunisia, Uruguay. |
| Other DCs: | Armenia, Azerbaijan, Bolivia, Cameroon, Congo, Cook Islands, Côte d'Ivoire, Dominica, Ecuador, Egypt, Gabon, Georgia, Ghana, Guatemala, Honduras, India, Indonesia, Jamaica, Kenya, Kyrgyzstan, Libya, Macedonia, FYR, Moldova, Mongolia, Morocco, Namibia, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Seychelles, Sri Lanka, Swaziland, Syria, Tajikistan, Venezuela, Vietnam, Zimbabwe. |
| LDCs: | Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Congo, Dem. Republic, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome & Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Tanzania, Togo, Tuvalu, Uganda, Vanuatu, Yemen, Zambia. |

Source: Ott et al. 2004

The positions expressed in this policy paper are strictly those of the author and represent neither the opinion of the Wuppertal Institute nor of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

The author would like to thank Christiane Beuermann, Thomas Forth, and Bettina Wittneben for their comments and suggestions, which have for the most part been incorporated in the text. Any remaining errors and omissions are the sole responsibility of the author.

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The Wuppertal Institute is carrying out the project „JKO Development Phase 2007 – 2009“ on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

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