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# The Sectoral Clean Development Mechanism – A Contribution from a Sustainable Transport Perspective

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**While the project portfolio of the Clean Development Mechanism (CDM) is expanding rapidly, the transport sector has so far played a rather minor role. In order to better understand why there are so few transport projects under the CDM, this paper examines current transport projects under the CDM framework and identifies potential barriers specific to the transport sector, e.g., the high complexity of transport projects, which renders methodology development difficult. In addition, this paper explores the extent to which and what kind of sectoral approaches to the CDM may provide a better framework for transport projects. To this end, different transport instruments are presented and discussed based on existing CDM criteria. We conclude that it is possible to design sectoral transport activities within clear project boundaries that fit into a framework of a programmatic or policy-based CDM. Although we are able to ascertain that transport policy research yields several modelling tools to address the methodological requirements of the CDM, sectoral approaches will only compound transport projects' problems regarding high complexity and related uncertainties. The CDM may therefore need new rules to manage these risks. Nevertheless, sectoral approaches allow the scaling up of activities to a level that affects long-term structural change. Permitting sectoral projects under the CDM may allow for the implementation of comprehensive measures such as transport master plans that can enable a variety of activities impacting transport trends significantly.**

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# 1 Introduction

The transport sector accounts for about a quarter of global carbon dioxide ($CO_2$) emissions (IEA 2005). Global transport-related greenhouse gas (GHG) emissions are currently rising by 2.5 percent per year, in the countries of the global South, the so-called developing countries, even by 4.4 percent (IEA 2004). The transport sector is thus the fastest growing source of GHG emissions. It is expected that the urban population in countries of the South will double by 2030, which may lead to a corresponding further increase of urban transport emissions (Browne et al. 2005: 2).

In order to tackle the high and ever-growing emissions from the transport sector there are no simple solutions. So far, improved fuel efficiency has always been jeopardized by the increase in the number and weight of cars as well as the kilometres travelled. In industrialized countries, the development of comprehensive transport policies has shown that although environmentally-friendly technology can mitigate GHG emissions in this field, a more deeply rooted, complex and integrated approach to managing transport policy can take hold of the issue with a stronger grip than technological innovation alone is able to. Fundamentally, spatial development that leads to avoidance of transport is the most effective tool in battling transport emissions (Petersen 2001). Sustainable solutions to transport policy need to first and foremost address the issue from this perspective.

Developing sustainable transport patterns in countries of the global South is one of the most urgent challenges in tackling climate change considering the growing trend in GHG emissions from this source. The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) provides with its Clean Development Mechanism (CDM) a way to encourage industrialized countries to foster climate-friendly projects in developing countries. This instrument might contribute to steering transport in the countries of the South into a more sustainable direction. The objective of the project-based mechanism is two-fold:

- to assist countries not included in Annex I to the UNFCCC ("developing countries") in achieving sustainable development, and
- to allow countries that are included in Annex I to the UNFCCC and have inscribed specified GHG emission targets in Annex B to the Kyoto Protocol ("industrialized countries") to acquire Certified Emission Reductions (CERs) from CDM project activities undertaken in Non-Annex I Parties and count them towards their Kyoto targets.

Although the CDM has proven to be a popular tool (to date more than1,500 projects have been registered or are at the validation stage, expecting a cumulative 1.7 billion CERs by 2012), there are currently only 2 transport projects at an advanced stage (Fenhann 2007). Generally, there have been critics voicing complaints that project activities most likely to enable host countries' sustainable development, such as renewable energy, energy efficiency and transport project activities, are not competitive and are marginalised in the CDM market. As a further concern, it has been noted that in its current form even good projects are isolated local efforts that contribute little to the sectoral transformations that will be necessary to effectively combat climate change (Sterk / Wittneben 2006).

This warrants a discussion on how the CDM could play a role in supporting sustainable development objectives in national transport policy. Scaling up the CDM from localised efforts to a more sectoral scope has been put forward as one potential means to enhance the sustainable development benefits the CDM can deliver (Sterk / Wittneben 2006). In particular, Browne et al. (2005) have suggested that sectoral approaches might provide a better fit for transport projects under the CDM than the current project-based approach. "Better" has two dimensions in this context. First, sectoral approaches might make it easier to address the methodological requirements of the CDM. Second, they might allow including activities that cannot be defined or implemented in a limited local context and generally enable the CDM to have a deeper impact on long-term structural trends.

The challenge is to define what a sectoral approach could mean for the transport sector and to assess the extent to which it would be feasible. Our research question for this paper may thus be stated as: Can a sectoral approach to the CDM provide a better framework for projects in line with a sustainable transport policy that encourages structural change and integrated policy making?

This paper is an attempt to bring together the knowledge gained from the experience in sustainable transport policy on the one hand, and the current debate on the evolving CDM structure on the other. The two policy dialogues need to be informed of each other's findings in order to meaningfully establish a climate regime that can tackle GHG emissions from the transport sector.

Starting with a definition of sustainable mobility and principles of sustainable transport policy, the following will then provide an overview of the opportunities for reducing $CO_2$ emissions using a sustainable transport policy lens in order to structure the options for a further analysis of future 'CDM compatibility'. Next, the paper describes recent CDM activity in the transport sector and discusses why certain strategies seem to provide a better fit with the CDM in its current form. In order to utilize the CDM as a mechanism to encourage integrated sustainable transport policy that elicits structural change in the national transport sector, the paper then examines the extent to which the evolving sectoral approach to the CDM could be made use of. In this vein, the current definitions and possibilities of a sectoral CDM are elaborated on, which is then connected to the need for a structurally integrated transport policy approach.

# 2 Approaches and Instruments in the Transport Sector

While it is widely recognised that transport is one of the main global sources of greenhouse gas emissions, in the transport decision-making arena these emissions are just one issue amongst other pressing concerns. In the environmental field these are negative impacts from transport in terms of air pollution, noise and landscape damage. Moreover, transport policy, much like other infrastructure policies, is mainly discussed not in environmental terms but in the context of economic development and social cohesion. Transport infrastructure is a location factor for trade and industry and an important economic indicator often used in discussion about job creation and equal life standard. However, in order to discuss sustainable transport, it is important to highlight that 'access' to different destinations and not to transport means is the key term for defining a sustainable transportation system (Litman 2003: 4). Being *mobile* does not mean to travel long distances but to have a variety of options for different human activities such as leisure, work or business (Petersen 2004, Becker 2006). In this context, there is an ongoing international debate on sustainable mobility and environmentally friendly transport policies (e.g. ECMT 2000, SRU 2005, Richardson 2005, Tuominen 2005) and the way to measure its implementation (Gudmundson et.al. 2005, EEA 2003).

The focus on sustainability can be explained by the fact that transport is a crosscutting issue, crucial for economic, social and environmental objectives of societies (Petersen 2002). Hence, a careful weighting of the different aspects is needed. In order to overcome the core conflict between transport-related environmental and socio-economic objectives, the concept of sustainable transport policy focuses on minimizing the negative effects of transport and maximizing economic prosperity and social equity. In this discourse the problem of greenhouse gas emissions is acknowledged (Brown 2005, World Bank 2002, ECMT 2000, WBCSD 2004). Especially growing figures of road transport in developing countries as well as global air transport highlight the challenges. Nevertheless, there are a number of proposals on how to tackle this concern. The options reach from internalisation of external costs (e.g. through taxes or emission trading) to transport and land use planning (ECMT 2000).

## 2.1 Strategies towards Sustainable Mobility

Today, sustainable transport is mentioned as a general guideline in many countries. For example, the current policy documents of the European Union (European Commission 2006) and the World Bank (1996, 2002) underline this aim. But also in the countries of the South, sustainability is on the transport policy agenda (Aßmann / Sieber 2005). However, the understanding of sustainability and the focus on the different dimensions differ. In order to come to a common understanding of sustainable mobility as the main objective for sustainable transport policy, it was necessary to introduce more specific principles. The most accepted approach was developed at the OECD Vancouver Conference in 1996 by formulating nine principles of sustainable mobility including *(1) access to other people, places, goods and services; (2) social, interregional and inter-generational equity, (3) Individual and Community Responsibility, (4) health and safety, (5) Education and Public Participation, (6) Integrated Planning, (7) Land and Resource Use (8) Pollution Prevention and (9) Economic Well-Being* (OECD 1996: 61-63).

Even if the reduction of $CO_2$ emissions is not explicitly named, reduction of energy use as well as energy efficiency is a key concept to serve these principles (Aßmann / Sieber 2005). In addition, measures towards other principles such as integrated planning and access can lead to a reduced use of energy. Also pursuing health, equity or education principles should not counteract environmental objectives. Nevertheless, transport policy varies enormously from country to country; both in the targets as well as the chosen instruments. According to the general principles, there is a broad variety of opportunities and instruments to influence transport. In order to come to a more specific picture of a sustainable transport policy, it is fruitful to look at political strategies that serve the implementation of the principles. Based on these strategies, categories of instruments can be described.

The political task is to provide mobility yet reduce the negative impacts of transport. Hence, three strategic approaches towards sustainable development in the transport sector have been identified in the literature (Klima-Enquete 1994, Petersen 2002, SRU 2005, Zegartowski 1997):

**1.) Transport Avoidance –** The most pressing task is to influence spatial planning in order to prevent transport (growth) without jeopardizing citizens' mobility. Sustainable (urban) infrastructure thus sets out to serve mobility needs of the population without generating excessive transport.

**2.) Shift to more sustainable transport modes –** A second-level task is to identify possibilities to make people choose more sustainable transport modes such as walking, cycling or public transport instead of driving a car.

**3.) Transport efficiency –** The third-level task is to improve transport technologies and transport flows in order to orchestrate the needed transport in the most efficient way without wasting resources.

Spatial development and transport avoidance is at the core of sustainable transport policies. Dense structures of housing, working facilities, shopping facilities and places for holidays and leisure allow people to practice their activities and to fulfil their business duties without much transport in terms of kilometres (Petersen 2002). A second strategic aspect of sustainable mobility is the way in which the (remaining) transport needs are satisfied. The different transport modes (walking, bikes, trains, busses, cars and planes) have very different advantages and disadvantages for individual choice. From a policy perspective aiming at sustainable development social, economic and environmental benefits have to be weighted (Basler+Partner 1998). As the non-motorized modes walking and cycling have the lowest impact on the environment, it is reasonable to foster policies that counteract the disadvantages of their short reach in terms of distance. Furthermore, a more efficient organisation of transport (technology / transport flow) serves sustainable transport. The remaining transport needs should be energy, cost and time efficient in order to serve environmental, social and economic objectives.

All three strategies are important and useful as normative guideline for individuals, corporate actors or policy makers. However, a hierarchy can be introduced with respect to the sustainability of measures. Firstly, transport avoidance is a top priority. Increasing mobility without increasing transport demand and thus inducing motorized traffic is the most promising way how social and economic goals can be related to environmental objectives. Hereby conflicts between the dimensions can be avoided most easily. Secondly, the shift from motorized modes to non-motorized serves a similar aim. However, a shift from car traffic to public transport still incorporates environmental (e.g. pollution) and social (e.g. costs, access to public transport) problems. Thirdly, the efficiency strategy is important but less sustainable. Even if there is a huge potential for energy savings in individual motorized transport and pollution could be reduced significantly by technological innovation, other sustainability objectives like economic well-being, equity or access are hardly affected. In addition, the negative impacts of e.g. cars in terms of landscape damage and noise cannot be reduced through more energy efficient engines.

## 2.2 Sustainable Transport Instruments

The presented strategies are normatively backed by the principles of sustainable mobility. The strategies point out the direction of action but still do not describe concrete action. In order to come to more specific activities, it is useful to distinguish (a) individual decisions or behaviour (b) municipal or corporate measures and (c) political steering approaches. All three of these kinds of activities are relevant for $CO_2$ emissions of the transport sector. While the first is related to personal preferences and opportunities, the second describes decisions of companies or municipalities that have a stronger impact on $CO_2$ emissions than individual action. The third category aims at changing the conditions for individual behaviour and corporate measures through setting a framework of incentives and rules. This distinction is important because until now, the project CDM mainly aims at corporate measures or *corporate policy* while the sustainable transport policy discourse is related to a more general approach of steering within *public policy.*[1] Coming from such a public policy perspective, the implementation of the presented strategic approaches requires a discussion of the instrumentation of concrete policy-making. For that reason, a typology will be proposed. In order to link the following discussion of instruments to the problem of climate change and the Clean Development Mechanism, it will focus on the consequences of the instruments for energy use and $CO_2$ emissions.

So far, integrated transport and land-use planning has been identified by the literature as a main steering approach to head into the future of sustainable transportation (Petersen 2002, Fischer 2002, Dalkmann 2004). The spatial structure and its transport system is the basis of the population's and business' transport behaviour. When only short distances are required to be overcome, efficient modes are chosen and efficient flows are possible, the impact of transport on the environment is limited. Hence, integrated transport and land-use planning is necessary to reduce greenhouse gas emissions. However, this promising approach is still lacking in most national transport policies. The planning focus is mainly on infrastructure construction instead of taking 'access' into account. Recent environmental approaches are still often focussing on regulation (e.g. emission limits) and aim at technology improvement (e.g. catalytic converters, efficient engines) in order to minimise the negative consequences of unsustainable spatial and transportation systems (Petersen / Schalleböck 1995). In addition, for the last decade, gasoline and purchase taxes have been used to provide incentives for developing and buying energy efficient technologies. Nevertheless, contradictory incentives, such as inexpensive housing in the suburbs, may still counteract these policies.

Generally speaking, sustainable transport is the consequence of different measures and policies aiming at influencing transportation need and behaviour. An integrated approach, taking different instruments into account, is required to foster sustainability and effectively combat rising emissions in the transport sector. Hence, the OECD developed a typology of instruments for environmentally sustainable transport. This includes regulatory, economic and informational instruments (OECD 2001). In order to describe the variety of approaches in the transport sector, an extended typology of instruments is suggested. This typology is based on the public policy approach of regulatory, distributive and re-distributive policies (e.g. Tömmel 2003) and adds the OECD's category of informative policies. This aims at the inclusion of 'new' or 'soft' instruments aiming at informing and convincing people to act differently (OECD 2002, Heritier 2002, Jordan et.al. 2005, Litman 2005). In order to remain in the terminology of transport policy, four types of instruments are introduced: *planning* (i.e. distributive), *regulatory, economic, and soft instruments* (see Table 1). Until now, sustainable transport literature focuses on public policies. However, corporate policies and activities which have so far been the main focus of the CDM can be subsumed under these types as well. Nevertheless, it must be considered that these are implemented on a different level.[2]

[1] In fact, since the Clean Development Mechanism aims at setting incentives for emission reductions, including in the transport sector, the mechanism as a whole – not the individual project – can be seen as a transport-related policy.

[2] On the local level, public authorities are able to act on both levels: Decisions on public service provision are more or less corporate policy (e.g. establishing a rapid bus transport system), while public policies aim at steering of the behaviour of individuals and businesses in the local community (parking fees).

**Table 1: Classification of Sustainable Transport Instruments**

| | Planning (distributive) | Regulation (normative) | Economic Instruments (re-distributive) | Soft Instruments (informative) |
|---|---|---|---|---|
| **Public Policy** | • Regional & urban land use planning<br>• Transport Infrastructure planning<br>• Least Cost Planning | • Physical norms and standards, (e.g. emission limits, safety)<br>• Regulation of traffic organisation (e.g. speed limits)<br>• Operation licence requirements (e.g. public transport, taxi)<br>• Regulation of decision-making (e.g. EIA, SEA, public participation, gender mainstreaming) | • Taxes on fuels<br>• Road-pricing<br>• Subsidies<br>• Purchase taxes<br>• Fees and levies<br>• Emission trading<br>• Auctions (e.g. vehicle licenses) | • Provision or support of mobility management and marketing schemes (e.g. car-clubs)<br>• Cooperative agreements<br>• Provision of eco-driving training schemes<br>• Co-ordination with regards to technical standards, procedures and R&D |
| **Corporate Policy** | • Company logistics<br>• Choice of location<br>• Choice of technology (e.g. bio-fuel) | • Travel rules (only public transport refunding, restrictions to air transport) | • Financial incentives for employees for using sustainable modes | • Implementation of Mobility Management<br>• Eco-driving training |

Not all kinds of instruments are associated with only one type of instrument, i.e. the presented classification describes ideal types. For example, regulation concerning public participation in a planning procedure is a combination of planning, informing policy makers, and regulation. Economic instruments may be seen as the government imposing regulations on the market. Furthermore, voluntary agreements are often closely related to regulative approaches. In addition, the instruments are often interdependent and do not work without others. Nevertheless, the classification is useful to discuss policy options in more depth. The following paragraphs describe the types and give illustrative examples.

Land-use and transport plans are associated with the entire set of strategies including transport avoidance, modal shifts and efficiency in terms of improvements of transport flows. In relation to sustainable mobility, transport planning is mainly discussed in terms of integrated land-use and transport planning (urban development and transport as well as different transport modes). The planning procedures can be closely linked to the principles of sustainable mobility including access, public participation, equity etc. The main intention of such plans is to allocate financial resources to define the future infrastructure development (e.g. land-use purposes, transport infrastructure) or design of transportation systems. But further instruments such as city tolls, parking fees or speed limits can be linked to the planning objectives. The inclusion of a Strategic Environmental Assessment (SEA) in a transport plan seems a promising contribution to move towards a more sustainable transport system (see Box 1).

### *Box 1: SEA in Local Transport Plans (LTP) in the UK*

Under the principles of the EU SEA Directive 2001/42/EC, a SEA has to be carried out regarding all plans and programmes that are likely to have significant environmental implications. The SEA process is integrated throughout all phases of the development of a plan or programme, notably during data collection, assessing the feasibility of options, the development of the preferred option, and monitoring its implementation. Local Transport Plans aim to encourage high quality planning and effective delivery of local transport. They provide a 5 year integrated transport strategy, which is consistent in its local objectives and the government's overarching objectives for transport planning.

Because the impact on the environment is uncertain and subject to change, it is important to integrate SEA into the transport policy and planning process from the beginning. As SEA involves target setting and requires public consultation, the publication of documents and monitoring of the actual effects of the plan as well as the development of a baseline scenario and planning alternatives, a SEA contributes significantly to key elements of a well prepared LTP.

Source: Department for Transport (DfT, online at: http://www.webtag.org.uk/webdocuments/2_Project_Manager/11_SEA/index.htm)

Regulatory instruments may comprehend a large variety of rules. Physical norms, market rules or traffic regulation cover a broad field of action. In addition, procedural rules such as public participation, gender mainstreaming or impact assessment procedures are regulations that make the picture even more complex. In general, such rules can easily be related to the principles of sustainable mobility (e.g. pollution avoidance, participation). In terms of the strategic approaches discussed above, the development of rules can promote different strategies. While speed limits and emission regulations are mainly linked to transport efficiency, market rules in the public transport sector can aim at shifting transport modes. Transport avoidance is mainly addressed by procedural rules that affect planning processes. Box 2 gives an example of $CO_2$ emission limits.

### *Box 2: Emission limits for $CO_2$*

The United States, Japan and China have introduced emission limits for the $CO_2$ emissions of cars. In the European Union a voluntary agreement fulfils the same objective. Although the European approach is not pure regulation, it is a good example how to measure the effects of the policy instrument. The commitments of the European, Japanese and Korean automobile industry require reducing the average $CO_2$ emissions of new passenger cars from 186 to 140 g $CO_2$/km from 1995 to 2008. The European Commission predicted potential savings assuming that a car travels 14,000 km a year, the average fleet age is 7 years and the number of cars is stable. The calculation was based on a reference scenario (baseline) of 380 Mt $CO_2$ emissions from passenger cars in 1990 and 536 Mt in 2010 with an annual growth in passenger car mileage of 2%. Furthermore, a linear reduction in average new passenger car $CO_2$ emissions was assumed as well as an average vehicle lifetime of 12 years. This assessment accounted 85 Mt $CO_2$ emission savings to the ACEA agreement. Monitoring is organised by the European nation states (environmental protection agencies) that measure emissions of new car models and count the registration of different car models.

Source: Bongardt, Kebeck 2006

The key rationale of economic instruments is to internalise the external costs of transport in order to avoid incentives for individual car or air transport and thereby influence the preferences of people towards sustainable non-motorized means of transport (Dalkmann 2004). Whether these are fuel taxes, city tolls or parking fees, people have to pay for environmental damage, health and security problems as well as the infrastructure needed. In addition, subsidies on energy efficient cars give incentives for consumers to consider different options. Economic instruments are related to all three strategic approaches: Pricing policies encourage transport avoidance, modal shift and the introduction of efficient technologies. A good example of an economic instrument is London's congestion charge (Box 3).

### *Box 3: Congestion Charge in London*

As part of the Mayor´s Transport Strategy in 2002, the Congestion Charging Scheme of Central London was introduced in February 2003 with the aim of reducing congestion and improving traffic conditions in central London. It is the first large-scale congestion charging scheme introduced in the UK and is expected to pay for itself within the next three years. The congestion charge encourages the use of non-car modes of transport and intends to ensure quicker and reliable journey times. It requires drivers to pay £8 a day if they drive within the charging zone between 7am and 6.30pm Monday to Fridays. All money raised from this charge has, by law, to be re-invested into London´s transport infrastructure. After the first six months of operation the public transport provider Transport for London (TfL) published a report surveying the scheme. Main findings were that the number of vehicles entering the zone dropped by 30 per cent. Around 50-60 per cent of this reduction was attributed to transfers to public transport. In a recent study (2005) TfL concluded that until 2004 the charge had succeeded in reducing congestion by 30 per cent and emissions of $NO_x$ and fine particles from traffic in the charge zone by 12 per cent. Moreover, fuel use and carbon dioxide emissions were reduced by about 20 per cent in the charging zone.

Source: http://www.tfl.gov.uk/tfl/downloads/pdf/cclondon/E-Environmental-Assessment.pdf

Cognitive instruments or 'soft policies' take effect in a different way. It is assumed that behaviour can be changed by informing or convincing people or companies. Most of these instruments take effect in direct communication with the people and not through changes in the framework. Hence, these instruments often take the form of corporate policy. Mobility management activities of business or individuals as well as eco-driving training (fuel efficient driving) are examples in the transport sector. However, there are schemes that take the form of a public policy instrument. Examples for such schemes are environmental audit schemes (for transport companies), the concept of travel plans for companies in the UK or information campaigns.

These modes of steering are important but quite vague and in some cases effects are hardly measurable. The instruments focus on information of the public or the consumers in order to encourage learning. The approach easily fits with sustainability principles since providing information about local destinations or environmentally friendly modes is a way to reduce transport without endangering access. In terms of the strategic approaches, again transport avoidance and shift of modes are at the core of these approaches. However, fuel efficiency can be encouraged through eco-driving trainings (see Box 4).

*Box 4: Eco-Driving Training in Companies*

More and more international companies provide eco-driving courses for their drivers. Examples are DHL and Deutsche Telekom AG. Since September 2004, 200 DHL Solutions Germany drivers have learned eco-driving techniques. The eco-driving programme helps DHL to reduce emissions from $CO_2$ and other pollutants. The Diesel consumption of the eco-driven vehicles came down by almost 10 per cent while driving time barely increased. The company benefits from lower fuel costs and less wear and tear on its vehicles and the employees benefit from a more relaxed driving manner and less stress. The Deutsche Telekom AG estimates the savings from their ecologically trained drivers at over 300.000 € annually.

Source: http://www.dpwn.de and http://www.umweltdaten.de/medien/oekostb2.pdf

This section described the concept of sustainable mobility and ways of its practical implementation in the transport sector. General principles and strategic approaches such as transport avoidance, modal shift and transport efficiency help to systemise a broad variety of instruments. Especially transport planning is able to support sustainable development and, as a side effect, encourage the reduction of greenhouse gas emissions. Regulatory, economic and soft instruments are supplementary to the integrated land-use and transport planning instruments and support behavioural change towards less energy consumption. While the following section focuses on recent attempts of setting up CDM in the transport sector, i.e. corporate policy, the public policy instruments described in this section will be discussed within the framework of sectoral approaches to the CDM in section 5.

# 3 Current Status of Transport Projects in the CDM

Considering the substantial impact of the transport sector on the global climate, it makes sense to tackle this growing source of GHG by setting up CDM projects. Box 5 describes the elaborate project cycle, laid down in the Marrakesh Accords, that projects have to undergo in order to become registered and generate CERs.

The first CDM projects faced many difficulties and delays in progressing through the full project cycle, but by now the CDM has become fully functional and is expanding rapidly. Currently, more than 1,500 projects have been registered or are at the validation stage, expecting a cumulative 1.7 billion CERs by 2012. However, the share of transport projects in terms of both number of projects and number of CERs is negligibly small: only two projects with 1.79 million expected cumulative CERs are currently at the validation stage or have been registered. Apart from these, eleven other transport projects (including small scale projects) have submitted proposals for new methodologies to the EB.[3] While the methodologies of five projects were rejected, the proposals of another six projects are still under consideration, although either in the second version already or with considerable obstacles regarding approval (Fenhann 2007).

[3] Because some of the projects submitted more than one methodology to the EB as indicated in Annex 1, the total number of transport methodologies submitted amounts to 14.

***Box 5: The Phases of the CDM Project Cycle***

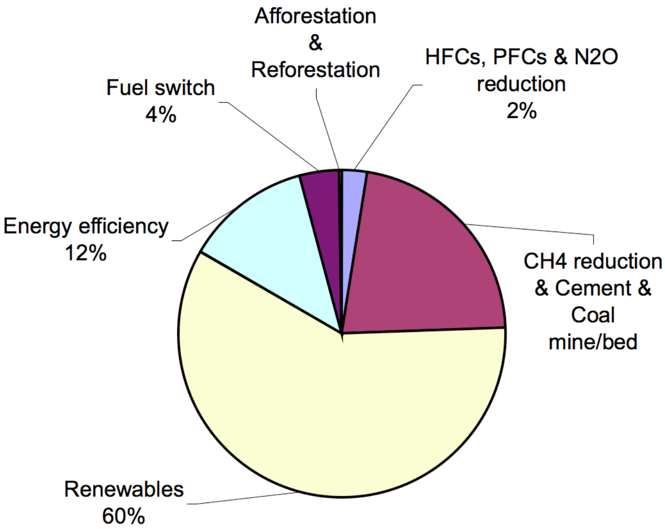
1. Preparation of the **Project Design Document (PDD)** by the project proponents. The PDD is the central document on the basis of which the Parties involved as well as the CDM Executive Board decide on the approval and registration of a project. For the purpose of calculating the emission abatement or carbon sequestration achieved by the project, the PDD has to establish a so-called **baseline**, i.e. a scenario that reasonably represents the emissions that would occur in the absence of the project. Moreover, the PDD needs to demonstrate that the emission reductions are "**additional**" to any that would occur in the absence of the project. The PDD also has to contain a plan for **monitoring** the project's emissions.
2. **Approval of new methodologies**: When the Baseline and Monitoring Plan are not designed according to approved methodologies, the project proponents need to develop their own methodology and submit it to the CDM Executive Board for approval.
3. **Approval by the Parties involved**, including confirmation by the host Party that the project supports it in achieving sustainable development.
4. **Validation** of the PDD, i.e. an examination whether the PDD meets all requirements, by an independent auditing company accredited with the CDM Executive Board, called **Designated Operational Entity (DOE)**.
5. **Registration** of the project activity by the CDM Executive Board.
6. **Implementation** of the project and **monitoring** of all relevant emissions / carbon sequestration by the project developer.
7. **Verification and certification** of the emission reductions / carbon sequestration by another DOE.
8. **Issuance** of the CERs by the CDM Executive Board.

Source: Own presentation on the basis of UNFCCC 2006a.

The methodologies which have been submitted can be divided into three different categories. One type of methodologies deals with switching from conventional to less emission-intensive fuels or biofuels, the second with efficiency improvements within one transport mode[4], and the third with modal shifts. The projects are listed in Table 2. Annex 1 provides a more detailed overview of the different projects sorted by category. The following outlines overarching methodological difficulties within each category in order to assess the extent to which projects fit in the CDM in its current form.

[4] Methodologies NM0158, NM0052 and NM0105 also contain modal shift elements.

**Figure 1: Number (%) of CDM Projects in Each Sector**




Source: Fenhann 2007

Fuel switch methodologies (NM0069, NM0082, NM0038, NM0108, NM0109, NM0129, NM0142, NM0180, NM0185, AMS-III.C.) in general face the problem that projects at all stages cause GHG emissions that are not directly linked to the project activity, i.e. leakages, such as $N_2O$ emissions due to the application of fertilizer in the production of biofuels or a potential change in the fuel efficiency of vehicle engines due to the use of biofuels. Methodologies have to detect the various sources of direct and indirect emissions and to quantify them. One great difficulty is the correct assessment of a possible change in "carbon pools", i.e. $CO_2$ stored in the form of biomass (in a specific area). To avoid an overestimation of emission reductions, the net decrease in carbon pools due to the project activity, be it directly or indirectly, and also a potential increase in carbon pools in the absence of the project activity have to be taken into account. Other leakages that were not treated adequately by most of the methodologies are listed in Annex 1. Furthermore, some innovative methodology proposals used a Life Cycle Assessment (LCA) approach to determine net emission reductions. They provided LCA emission factors for both the conventional fuel that is to be substituted and for the biofuel to assess GHG emission of each fuel from cradle to grave. Although in general judged to be an appropriate approach by the Executive Board's Methodology Panel, the methodologies that were submitted used emission factors that were not applicable to the respective project activity. Currently another considerable problem seems to be the avoidance of double counting. Methodologies claiming CERs from the production of biofuels have to ensure that a potential project activity at the demand side does not also claim CERs for the use of the same biofuels. To facilitate clarifications the EB agreed to open a call for public inputs on the issue starting 2 October and ending on 20 October 06.[5] The EB further noted in its Final Recommendation on methodology NM0185 that a "guidance tool" will be developed and approved.[6]

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5 See http://cdm.unfccc.int/public_inputs/meth_doublecounting_biofuels/index.html [accessed 16 October 2006].

6 See http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?OpenRound=16&OpenNM=NM0185&cases=B#NM0185 [accessed 24 October 2006].

**Table 2: Proposed CDM Transport Methodologies**

| Fuel Switch | Efficiency Improvements | Modal Shift |
|---|---|---|
| Switching fossil fuels from petro-diesel to biodiesel in transport sector (NM0069. NM0108) | Behaviour-oriented demand-side EE program (Small Scale) (SSC41) | Change from road to sea transport NM0128 |
| Transportation bio-fuel production with life-cycle-assessment (LCA) (NM0109, NM0129) | BRT project. Mexico (NM0158), *including modal shift elements* | Change from road to pipeline transport (SSC58) (Small Scale) |
| Khon Kaen fuel ethanol project (NM0082, NM0185) | Transmilenio – urban mass transportation system (NM0052, NM0105), *including modal shift elements* | Cosipar Transport Modal Shift Project (NM0201) |
| Palm methyl ester biodiesel fuel production for transport using LCA (NM0142) | | |
| LPG retail outlets for cars (NM0083) | | |
| Emission reductions by low-greenhouse gas emitting vehicles (AMS-III.C.) (Small Scale) | | |
| Biolux Benji Biodiesel Beijing Project (NM0180) | | |

Except for these overarching difficulties, the methodologies also contained many project-specific flaws. Most of the errors, wrong assumptions and conclusions can be corrected more or less easily, though. It can therefore be concluded that fuel switch methodologies in the transport sector are relatively straightforward and do fit well in the present CDM once the general uncertainties are resolved. In fact, one small-scale methodology already received approval, another methodology is close to being approved and others seem to be on track as well.

As for the second category, efficiency improvements within a transport mode, so far four methodologies have been submitted (NM0052, NM0105, NM0158, SSC41). While three of them address activities in the public sector, the fourth one (SSC41), which aimed at companies or organizations with a vehicle fleet, could be applied in both the public and the private sector. The methodology proposal comprised training programmes promoting behavioural changes to achieve a more efficient operation of vehicles. However, the EB decided that this type of methodology is in principle not eligible under the CDM because the measured emission reductions are not directly attributable to the project activity.[7]

The remaining three methodology proposals in the second category stem from two similar projects aiming at the introduction of Bus Rapid Transit Systems (BRT), one located in Bogotá, Colombia (NM0052, NM0105), and one in Mexico City (NM0158). To provide a rough insight in the projects and the methodologies respectively, main characteristics of the already approved methodology NM0105 are presented in the following.

The main objectives of the underlying project, the introduction of a BRT in Bogotá, are to establish an improved mobility system, reducing congestion and trip times and increased attractiveness of public transport, thus reversing the declining share of public transit and a reduction of air and noise pollution as well as $CO_2$

7 See EB decision at: http://cdm.unfccc.int/methodologies/SSCmethodologies/Clarifications [accessed 24 October 2006].

emissions. The CDM project includes 157 km of new dedicated trunk routes, around 1,700 new buses operating on trunk routes and feeder lines. It is expected that in 2014 2.3 million passengers will be transported daily. The core environmental aspect of "TransMilenio" is to improve the resource efficiency, i.e. fuel consumption, and emissions per passenger trip compared to the situation without the project. This is to be realized through improved efficiency (new buses), mode switching (attracting car users) and change in occupancy (organizational measures). It is expected that the project will reduce $CO_2$ emissions by 3.3 million tonnes between 2006 and 2016. The project not only considers the improved efficiency of new busses but also includes a modal shift component. This requires a more complex methodology measuring people's transport behaviour. Hence, an annual survey of 2,500 customers is the basis for considering the alternative modes of people, induced traffic, fuel type, occupancy rate and trip length. Together with counting the number of customers, this survey provides the essential information for calculating the business as usual case as well as the effects of the measures.

As in the case of fuel switch, the early methodology proposals dealing with efficiency improvements and modal shifts in the public sector possessed various project-specific flaws, maybe even more of them. However, they also faced similar more general difficulties. All methodologies had errors concerning the baseline calculation. In the case of methodology NM0158 possible alternative developments to the project activity were reduced to those which complied with specific data requirements established in the methodology. NM0052 was basically criticized for not providing a real method to identify the baseline scenario, i.e. the baseline determination was too project-specific and could hardly have been adopted by other projects. Also it was noted for both NM0052 and NM 0158 that a purely static baseline was questionable as important parameters (emissions factors, fuel efficiency, average trip length, etc.) might change over time.

Similarly the proof of additionality seems to be complicated. Again NM0052 was criticized for not providing a method to demonstrate the additionality of the project. It also lacked on clarity why the project would be additional, given that the BRT is already in its second phase of implementation. Although NM0158 used the "tool for the demonstration and assessment of additionality", there was no additional guidance on how the tool should be used for this particular project category.[8]

Furthermore, due to their high complexity the methodologies contained various explicit and implicit assumptions, for instance it was assumed that the so-called "rebound effect" would not occur.[9] Although some assumptions are indispensable to limit complexity and guarantee applicability, the majority of the ones used in the methodologies submitted are questionable as indicated by the EB.

In sum, projects reorganizing public mobility services, especially if modal shift elements are included, have impacts on various disperse emission sources. The necessity to consider, evaluate and measure the diverse direct and indirect effects as well as leakages not only hampers baseline development and the calculation of emission reductions, but also considerably complicates monitoring. There is a serious danger that measured emission reductions are not (only) caused by the project activity but by a variety of other factors influencing emissions. Apart from the other problems highlighted, NM0158 was also specifically criticized for creating a

8 For NM0052 see: http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?OpenRound=6&OpenNM=NM0052&cases=C#NM0052 [accessed on 7 January 07]
For NM0158 see: http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?OpenRound=6&OpenNM=NM0052&cases=C#NM0052 [accessed on 7 January 07]

9 If a project activity reduces traffic on a specific route, the created space may be occupied by new trips undertaken due to the more comfortable road situation. The term „rebound effect" describes these phenomena.

"bubble" that was too large and might lead to emission reductions due to other factors being attributed to the project.[10]

NM0105[11], the strongly improved second version of NM0052, just contained smaller deficiencies and was finally able to address all shortcomings to the satisfaction of the EB. But it is now very challenging to define the BAU scenario and the EB remarked that the methodology is complicated, requires lots of data and is therefore difficult to apply.

Within the third category – projects aiming at a modal shift – all methodologies that were so far submitted address activities in the private sector (NM0128, NM0201, SSC58). Compared with projects in the public sector, they are less complex and can be established more easily since most of the diverse effects complicating development of adequate methodologies considerably are missing in the private sector. Nevertheless, the methodologies so far assessed by the EB all contained substantial project-specific shortcomings and therefore also require significant revision.

A first conclusion to be drawn from the analysis is that all projects fall within the second and third strategy outlined in section 2, i.e. modal shift and increasing efficiency. However, moving towards sustainable transport systems requires the implementation of elements from all three strategies. In particular the approach to avoid transport through spatial and transport planning is so far missing within the CDM. A second conclusion is that one main reason why there are so far only very few transport projects in the pipeline is their high complexity.

Projects undertaking fuel switch (or technological changes at specific vehicles) seem to be suitable under the current form of the CDM since the project can be clearly defined and it therefore seems possible to overcome methodological problems. However, even in these cases methodology development has been a long and complicated process and is yet to be successfully concluded. All methodologies currently under consideration had been submitted to the EB for the first time in 2004 or 2005 already. Key problems relate to potential leakages and double counting.

Especially projects located in the public sector combining efficiency improvements with modal shift elements face even more difficulties when developing an appropriate methodology. Due to the various emission sources impacted by such projects, baseline development and the calculation and monitoring of emission reductions is challenging and requires lots of data. In consequence, methodologies are very complex and difficult to develop and to apply.

It has to be noted, though, that the CDM is still a relatively new instrument and problems of complexity are not unique to the transport sector. Further projects may yet find ways to overcome the methodological challenges. From this perspective, the current underrepresentation of transport projects may be an expression of typical start-up difficulties rather than an indication of fundamental problems.

[10] See Final Recommendation on NM0158 at: http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?OpenRound=14&OpenNM=NM0158&cases=C#NM0158 [assessed on 7 January 07]

[11] See : http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?OpenNM=NM0105&single=1 [accessed on 7 January 07]

# 4 Sectoral Approaches to the CDM

## 4.1 Defining Sectoral Approaches

The concept of a sectoral CDM was first introduced by Samaniago and Figueres (2002). It entered the broader debate in 2005 when the CDM was being severely criticised from different sides for various perceived shortcomings. On the one hand, critics highlighted very high transaction costs and lengthy procedures stifling project development. On the other hand, the CDM was perceived as being limited to isolated local efforts and thus failing to achieve transformational effects at a scale that would be necessary to effectively contribute to sustainable development. Sectoral approaches were put forward as one potential remedy for these deficits (Sterk / Wittneben 2006).[12]

The debate on sectoral approaches did not focus on one specific concept. Instead, several different models were proposed:

- Samaniago and Figueres (2002) suggested a government-driven mechanism that would enable developing countries to develop national or local **policy initiatives** that discernibly reduce 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 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: 55-57) labelled this approach "policy-based" and defined a "sectoral CDM" as 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: 8) discussed a "**programmatic crediting mechanism**" that might encompass both public and private actors. This term was taken up by Figueres et al. (2005: 7) 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 but with one central actor who provides an incentive. Some such projects have in fact already been registered. One example is the Kuyasa housing project in South Africa. It consists of upgrading the energy efficiency of more than 2,000 households and is coordinated by the City of Cape Town and the organization SouthSouthNorth. [13]
- Bosi and Ellis (2005) (developed further in Baron / Ellis (2006)) propose 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

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[12] As to the first line of criticism, it bears pointing out that the CDM project pipeline has since virtually exploded. The observed bottlenecks were therefore probably rather due to usual birth pains and shortages in funding rather than to structural weaknesses.

[13] See Project 0079 : Kuyasa low-cost urban housing energy upgrade project, Khayelitsha (Cape Town; South Africa): http://cdm.unfccc.int/Projects/DB/DNV-CUK1121165382.34/view.html [accessed 24 October 2006].

mechanism could be implemented at the government level or might be devolved to the private entities in the respective sector. As they envisage it, such a mechanism would probably run in parallel to rather than be incorporated into the CDM. 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.

The political discussion culminated at the first Conference of the Parties to the UNFCCC serving as Meeting of the Parties to the Kyoto Protocol (COP/MOP 1). The Parties decided that "project activities under a programme of activities" as well as bundles of large-scale project activities may be registered as single CDM project activities whereas policies or standards cannot (FCCC/KP/CMP/2005/L.7).

However, it can be expected that the issue of policies and standards has not been wiped off the agenda for good but will resurface in the negotiations on the Kyoto Protocol's second commitment period after 2012. Moreover, it was not immediately clear whether a programmatic project that *implements* a policy or standard could qualify for CDM registration. At its 28th meeting, the CDM Executive Board finally passed guidance on the implementation of programmatic projects. According to this guidance, programmatic projects may indeed implement any policy/measure or stated goal, including mandatory policies and regulations if it is demonstrated that these are not being enforced as envisaged (UNFCCC 2006b). One example that is currently going through the CDM approval process is a project that would implement an energy efficiency standard for air conditioners in Ghana (UNFCCC 2006c).

Nevertheless, sectoral project activities still pose a number of design and methodological challenges which need to be examined. Some of the key concerns will be outlined in the following. Since the transport instruments outlined in section 2 are mainly policies, the following will go no further into the details of large-scale bundles or sectoral targets but focus on the implications of including policies in the CDM, be it under an explicitly policy-based approach or through a programme of activities implementing a policy.

## 4.2 Key Design and Methodological Challenges of a Sectoral CDM

### 4.2.1 Defining the Project Boundary

One crucial step in developing a CDM project is to clearly delineate the CDM project boundary. A whole range of definitions for sectoral projects has been suggested and is conceivable (e.g. Samaniego and Figueres 2002: 92f), but there does not seem to be a need to prescribe any one formula. Rather, the bottom-up approach of the current CDM could be adopted, with each project elaborating its own particular definition. There could thus be various definitions for different projects within one county.

Among the possible approaches are:

- using a traditional sectoral definition such as the energy sector,
- looking above or below the traditional sectors, for example, by defining the upgrading of all gas-fired power plants in a country to combined cycles as a project,
- defining a city or a local area as a sector,
- comprising all the emissions of one particular non-$CO_2$ gas in a country in one project,
- targeting the application of one particular technology,
- cooperating with other countries in the region to set up a type of project across national boundaries,
- taking a combination of approaches, e.g. transport in a particular city.

Nevertheless, the actual delineation of the project boundary on the ground may be very challenging. In the CDM, the project boundary shall encompass all anthropogenic emissions by sources of GHG under the control of the project participants that are significant and reasonably attributable to the CDM project activity. Projects also have to account for leakages, i.e. emissions outside the project boundary that are due to the implementation of the project activity. Meeting these requirements at a sectoral level, which is liable to encompass a huge number of emission sources, may take significant effort. This may especially be the case in the transport sector, which is characterised by huge numbers of very small mobile emission sources.

The complexities are exemplified by the case of the Ghana air conditioner efficiency standard. The PDD defines the project boundary as covering all consumers connected to the electricity grid in Ghana so as to cover all air conditioners purchased in the country after the implementation of the project. The project has to take into account potential leakages that could arise from an increased use of air conditioners induced by the lower operating costs of more efficient appliances. It also has to distinguish such effects from increased uses of air conditioners that may be due to other factors such as falling electricity prices or abnormal weather. It proposes to do so by tracking increases in operating hours and comparing them to historic trends (UNFCCC 2006d).

### 4.2.2 Baseline and Additionality

The CDM Executive Board has decided that baseline setting does not need to take into account climate-friendly domestic policy efforts that have been put in place after 2001. Instead, baseline setting and the demonstration of additionality should refer to a hypothetical scenario without the respective policy in place (UNFCCC 2005b). It could therefore be argued that the baseline for a policy-based project could follow the same principle. The Ghana air conditioner standard project does in fact follow this approach (UNFCCC 2006d).

However, what should additionality mean for such projects? Given the complexity of the political decision-making process it could probably hardly be demonstrated that a policy is adopted mainly because of climate change considerations. Samaniego and Figueres (2002) therefore suggested that a sectoral CDM should be modelled along the lines of the "sustainable development policies and measures" approach. This approach seeks to make Non-Annex I Parties adopt commitments in the area of policies and measures that are geared towards development but also entail climate benefits (Winkler et al. 2002). Modelling a policy-based CDM on this approach would mean to focus on policies and measures with development benefits that also have climate benefits and using the CERs as an added incentive. To prevent business-as-usual emission reductions from being credited, projects would have to demonstrate that there are barriers preventing their implementation or that they clearly deviate from historical and/or projected future trends.

However, it may well be impossible to establish a direct link between a sectoral project activity and a climate benefit that has been observed. When looking at sectoral developments, typically a myriad of factors come into play. If a government, for example, introduces fuel efficiency standards and consequently a drop in transport emissions is measured, how can it be determined to what extent this drop has been a result of the government policy or due to other factors such as rising fuel prices? This gives rise to the question whether CERs should be attributed to the entire climate benefit achieved below the baseline or whether the project should be evaluated *ex-post* as to its actual impact and the CERs be issued accordingly. The second option would be more accurate in ensuring that only the additional climate benefit is credited. However, this might require a very complex procedure. The simpler solution to credit everything that is below the baseline would therefore be more practical. It might be acceptable if the sectoral baseline is very stringent to ensure that no business-as-usual emission abatement is credited (Bosi and Ellis 2005: 19-21). A further option could be to discount the emission reduction, i.e. issue CERs only for a part of emission reduction below the baseline that has been measured. The question here would be at which level the discount rate should be set. One possibility could be to quantify the level of uncertainty of the measurement and set the discount rate at this level.

Having said that, policy makers do not necessarily need to choose only one of these options but could instead implement a detailed examination for projects where this is possible and to set a stricter baseline or discount the claimed emission reduction where it is not.

### 4.2.3 Project Approval Process

Scaling the CDM up to a sectoral level gives rise to the question whether the current project approval process would still be appropriate. Samaniego and Figueres (2002: 93) suggested that a sectoral CDM could indeed follow the current CDM model: approval by a DNA, validation by a DOE, submission to the CDM Executive Board, monitoring by the project participants and verification and certification by another DOE. By contrast, Bosi and Ellis (2005: 22f) suggested that the system could also be based on international negotiations. In such a mechanism, the countries which are interested in participating would make project proposals to the international community and the details would then be defined by multilateral agreement. Nevertheless, when using this option it may still also be useful to have an executive body to oversee the actual operation of the projects.

The former concept is less complex and to a large extent leaves the direction of the process to the project proponents. However, it might well be advisable to have an in-depth political examination considering the impact and volume of CERs large-scale sectoral projects may create as well as the fact that the requirement for host country approval loses its meaning when a project is proposed by the national government.

The issue of how to organise the approval process is especially pertinent with regard to the sustainable development requirement. Under the current CDM rules, it is the prerogative of the host country to check whether a project supports its sustainable development. In the case of a policy-based project this would mean that the government is asked to approve its own plans. Should it then just be assumed that the project will contribute to sustainable development, or is there a need to establish criteria or even to prescribe an examination procedure?

### 4.2.4 Distribution of Costs and Benefits

Especially in the case of a policy-based mechanism, the sectoral CDM would turn an instrument that was originally targeted at private investment into a tool for governments to finance climate-friendly policy measures. Governments could choose to pass on the benefits accrued from the value of the CERs to investors or those affected, which may be industry or other private actors, in the form of tax incentives, subsidy or the direct pay-out of CERs. Paying out CERs directly would transfer the risk inherent to the publicly traded CERs to industry or the end consumer. It will probably be difficult to ascertain exactly how the CER rewards will be distributed between public and private actors. How much can a government charge for the preparation of a sectoral CDM project? On the one hand, if the part of the total CERs that a government claims for its work was too high, market participants could be reluctant to follow the new policy or investors could hesitate to take advantage of the CDM opportunity. On the other hand, if the CERs were passed on directly to private investors in the sectoral CDM scheme, taxpayers would be left with the burden of the much-debated transaction costs of setting up such a project but without the financial benefit of the CDM. The balance in this distribution has to be struck early in the process of setting up a sectoral CDM project to avoid conflict or disappointment later.

In private sector initiatives under a programme of activities, participation would be voluntary. There should therefore be no situations in which costs are imposed top-down without the private entities required to act receiving a corresponding share of the benefits.

In both public and private sector initiatives, there is a danger that individual actors in a project activity might want to claim CERs for their respective actions in addition to the CERs claimed by the overall project. This possibility would need to be precluded either by agreement between the potential claimants, by the DNA not approving projects where there is a possibility of double counting, or by specifying the baseline methodology in such a way that no double counting may occur (Figueres et al. 2005: 24-26).

### 4.2.5 Relation to the Current CDM

A sectoral CDM should in principle be able to complement rather than supplant the current CDM. In particular, there is no reason why areas not covered by sectoral projects should not be open to local projects. Nevertheless, there are some issues that have to be resolved: what happens if an already existing local CDM project is encompassed in or connected to a new sectoral CDM project or, alternatively, if a project developer intends to develop a local project that is directly or indirectly connected to an already existing sectoral project? The most important issue here is the so-called double counting: if the local project receives CERs for the climate benefit it has achieved and the sectoral project also receives CERs for the contribution made by the local project, one and the same climate benefit is in effect 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 project. Another option would be to prohibit the implementation of such local projects, which seems unduly restrictive. In any case, a solution would then still need to be found for the local projects that are already in place when a sectoral project is launched. Regarding individual cases it might also be possible to merge an already existing local CDM project into the new sectoral project and the CER distribution system that has been established there.

In addition, since most economic segments are interlinked, the double counting problem might also arise if there was more than one sectoral project in a country. One hypothetical example would be to conduct one sectoral project that introduces energy efficient appliances in households and another project addressing the energy sector. These two sectoral projects are clearly linked and it might be difficult to ascertain which one should be awarded the CERs earned. This could mean that a country that stages an ambitious sectoral CDM project may thus close itself off to other CDM project approvals. The linkages between projects would therefore need to be examined for each particular case.

# 5 Applying Sectoral CDM Approaches to the Transport Sector

Section 2 has highlighted that there is a wide variety of measures that can be taken to steer transport patterns into a more sustainable direction. The following paragraphs will frame these instruments according to the requirements of the CDM project cycle. The key questions that need to be answered are:

- What would be the **CDM project activity** in each respective case? A CDM project activity has been defined as a *measure, operation or an action* that aims at reducing greenhouse gas emissions. It needs to have a *real, direct and measurable impact* on GHG emissions.
- Who would be the **project participants**? In general, a project participant may be (a) a Party involved, or (b) a private and/or public entity authorized by a Party involved to participate in a CDM project activity.
- What would be the **project boundary**? In the CDM, the **project boundary** shall encompass all anthropogenic *emissions by sources* of GHG *under the control of the project participants that are significant and reasonably attributable to the CDM project activity.* Would there be potential for **leakage?**
- What would be the **baseline** and how would it be set in each respective case?
- How would the demonstration of **additionality** be carried out?
- How would the project's emissions be **monitored**?
- What would be the **emission reduction**, in particular, should there be a discount or other limitations on what may be credited?
- What would be the **contribution to sustainable development**?

The question is if and how the presented instruments of section 2 fit and what would be the consequences for (a) policy formulation and design of instruments, and (b) the design of a sectoral CDM. Thus, opportunities and limits for further development of the CDM in the transport sector will be identified.

In principle, each single transport instrument and measure could be assessed against the above checklist. This is certainly a task worth to be done but not possible in this paper. Further research would be necessary and more detailed information about measures and instruments would be needed. Nevertheless, a rough assessment of the presented typology is possible and helps to identify options and suggestions for the CDM. For each type of instruments, examples will be given and discussed against the CDM checklist. The examples are all from industrialized countries and the instruments have to be transferred to developing countries. While for planning instruments like SEA there is already a policy framework and experience in different countries such as China or South Africa, some concrete measures like congestion charging would probably require a technological leapfrogging (Dalkmann 2004). Nevertheless, all the presented instruments are necessary for a long-term sustainable transport strategy, and the CDM could potentially contribute to their development and implementation in developing countries.

*Planning Instruments*

In most cases of planning instruments, a political body decides to initiate a planning process and commissions a particular unit of administration. The decision of the plan and its implementation is in most cases defined in a general timeframe at the beginning of the planning procedures, and the whole process can be seen as one continuous activity. However, the measures to be included can vary and change during the planning process. For example, in transport plans it is to some extent left open at the beginning whether investments in new roads, reorganisation of bus routes, change of modes, pricing or new forms of customer information are included. The task of the planning process is to define such measures and decide on the best options for future development and the necessary investments. Some measures defined in the plan can be policies. Nevertheless, the planning process and its implementation can be understood as a **project activity** in the sense of a measure or operation that aims at reducing GHG emissions and it easily fits the EB's definition of a "programme" as a "coordinated action by a private or public entity which coordinates and implements any policy/measure" that leads to GHG emission reductions via an unlimited number of activities under the programme. Potential policy elements of a transport plan could be incorporated in the form of activities that implement these policies. Importantly in this context, the EB guidance does not require that all activities under a programme be defined ex ante but permits individual activities to be added to the programme at any time during its duration (UNFCCC 2006b).

In addition to the administration, further **participants** can be incorporated. Depending on the issue this might be authorities of neighbour regions, investors, NGOs, unions etc. For example, urban transport master plans require the involvement of the administration, public transport providers as well as passenger organisations and the union of drivers. The **project boundary** needs to cover all transport emissions addressed by the plan, which may require a complex procedure depending on the scope of the plan. Land-use and transport master plans can be related to different levels of administrative units aiming at local, regional, national or international societal functions. Identifying sources and accounting for leakage may also be complex depending on the measures that are to be undertaken. For example, if one activity was to construct new transport infrastructure, the project would have to account for the GHG emissions caused by the construction.

Regarding the baseline-setting and monitoring requirements, there are several starting points. Methodological parallels can be found especially in Strategic Environmental Assessment (SEA). SEA provides not only procedural rules for incorporating environmental objectives in planning processes but also a suitable methodology for the assessment of the environmental impact (Therivel 2004; Sadler 2006). Through predicting net effects of induced or reduced traffic, overall energy consumption is calculated for different planning scenarios (alternatives) on the basis of complex transport models (Gühneman 2000). Transport models have a long history within transport research and they are essential for all planning processes. Nevertheless, transport models are based on a broad variety of assumptions and might not meet the level of accuracy required under the CDM. Their applicability to the CDM therefore warrants further study. In addition, the development and adaptation of models require financial resources that are small compared to the costs of construction but still need to be taken into account.

In a SEA application to a Local Transport Plan (LTP) (see Box 1), an assessment of the status quo scenario as well as the business-as-usual scenario representing the development that would most plausibly take place in the absence of the LTP is required. The latter could serve as the CDM **baseline**. Also the effect of the proposed measures including the **estimated emission reductions** is calculated. $CO_2$ emissions are a key indicator for SEAs in the transport sector, as cumulative emission effects of transport networks and induced traffic are major problems. The preparation of **monitoring** is also obligatory within SEA procedures. Hence indicators exist and data is collected anyway. However, it must be considered that like all forecasts the models and assessments are connected to a certain level of uncertainty and depend on a set of assumptions introduced by the participants. In order to come to better decisions about indicators and assumptions, SEA requires the participation of environmental authorities and independent actors in order to improve the assessment. Regarding **sustainable development**, planning instruments generally have a high potential for including economic, social and environmental issues (Petersen 2004). The task of transport or land-use plans is to weigh the different aspects.

The most difficult part will be the demonstration of **additionality**. In many countries or regions plans and programmes are common administrative instruments. Therefore, it is necessary to define and assess the additional impact of the plan. It might be possible to define a certain set of measures as 'additional' and calculate two different scenarios with and without this set. Another possible way is to define only a share of the emission reductions as additional. But in such countries of the South that do not have mandatory planning rules, introducing transport plans as a sectoral CDM 'project' is in any case a benefit, not only in terms of emission reductions but for promoting sustainable development more generally.

To conclude, planning processes can be defined in terms of programmatic CDM, and there are highly developed methods of environmental assessment. However, whether these methods are accurate enough to meet the requirements of the CDM will require further study. But it can be assumed that assessing the effects of planning processes is aligned with more uncertainty than assessing localised project activities. Therefore, ways would need to be found to address this uncertainty.

*Regulative Instruments*

Regulations can also be understood in the sense of measures that aim at reducing GHG emissions but according to the COP/MOP 1 decision, policies and standards are not eligible under the CDM. By themselves, regulations also do not meet the requirement of leading to direct reductions in GHG emissions. The establishment of a regulation as a CDM project would therefore only be possible if changes were made to the CDM rules, but these would probably take effect only in future commitment periods of the Kyoto Protocol. However, according to the EB guidance activities to *implement* a regulation can in principle be carried out under a programme of activities if the regulation is not mandatory or if there are barriers to enforcement.[14]

In general, rule making is the province of governments. The authorities on different levels define rules adequate to their decision competence. The regulations set up by the different bodies are in general complementary. Hence, sectoral administrations and political representatives on different levels are the main **participants**. However, cross-regional cooperation or international regimes may lead to an extension of the stakeholders involved. The **boundary** would cover all emission sources covered by the regulation. Once the activity is defined properly, an assessment of the impacts is needed. Like in planning processes, there are experiences with impact assessment procedures for policies as well. As until now few full ex-ante environmental assessments of policies have been carried out[15] it could be worth to look at research projects on ex-post evaluation of policies.

[14] The Ghana air conditioner standard will be a crucial test case.

[15] There are experiences in The Neteherlands with the E-Test and other assessments e.g. in Canada, New Zealand, the Czech Republic and Denmark.

Taking the example of the ACEA Agreement (see Box 2), the project participants would be the European Commission and ACEA. The national governments might also be included as project participants, in particular since their environment protection agencies are responsible for monitoring the agreement. The project boundary would encompass all $CO_2$ emissions from the whole fleet of cars newly registered after the introduction of the agreement. The Commission's rough assessment of the possible effects of the voluntary agreement is an example of an ex-ante assessment providing both the **baseline** and the expected **emission reduction** (see Box 2). Since the agreement's target is substantially below business-as-usual forecasts, it could be taken to be **additional** in the CDM context. The agreement is also a good example for **monitoring** of regulatory instruments. Average $CO_2$ emissions from passenger cars in the European Union have been reduced from 185 g $CO_2$/km in 1995 to 163 g $CO_2$/km in 2003. Based on statistics of the number and fuel consumption of newly registered cars, $CO_2$ emissions can be calculated by assuming average driven kilometres based on transport models. In a rough assessment, ACEA calculated that improvements in its cars have contributed almost 35 Mt $CO_2$ emission reductions between 1995 and 2002 (Bongardt, Kebeck 2006). A CDM methodology for this case would require predicting and monitoring the development of driven kilometres for newly registered cars to factor in potential rebound effects due to the lower operating costs of more efficient cars and other factors leading to changed driving behaviour, such as potential rises in gasoline prices. So far, this is not included in the official monitoring procedure. It would be possible to fulfil these requirements on the basis of government statistics and transport surveys. If the assessment did take into account the whole fleet of new cars and the actual movement of cars, **leakages** could probably only occur if the production of less $CO_2$-emitting cars was more $CO_2$-intensive than the production of more $CO_2$-emitting cars, which would need to be assessed.

Environmental standards for bus fleets might be even easier and more precise to assess than the monitoring of individual transport. Effects of speed limits or market rules are closely related to other measures such as planning or economic development and more difficult to assess. The contribution to **sustainable development** of a regulation could be determined through the tool of sustainability impact assessment.

Regulation is at the core of policy-making. Norms and limits are developed in the political system on all territorial levels. Regarding transport, emission or speed limits, traffic rules etc. are omnipresent. Again, **additionality** will be a major critical point. Furthermore, the project activity is not as easy to define as for planning instruments and includes more uncertainty. There are methodological approaches how to assess and monitor the activity. Again, whether these methods are accurate enough to meet the requirements of the CDM will require further study.

*Economic Instruments*

Unlike regulations, which set norms and limits to products and behaviour, economic instruments aim at changing the preferences of individual and business mobility. Including external costs into the price of transport activities (e.g. eco-tax, parking fees, congestion charge etc.) is supposed to lead to behavioural change and thus emission reductions. But the design of economic instruments, i.e. the definition as a **project activity**, is similar to regulation. Hence, the forms of defining a time frame, the project boundary and participants and the baseline as well as the assessment and monitoring of effects are comparable and incorporate the same opportunities and problems. Like in regulation, the assessment of effects seems to be a major difficulty. However, there are methodologies for the evaluation of economic instruments. For example, the German Environmental Agency carried out an ex-ante evaluation of the 1999 eco-taxation law and assessed the effects between 2000 and 2010 based on a modelling approach: *„The simulation shows a 2% to 3% medium-*

*term reduction of $CO_2$ emissions compared with the scenario without the ecological tax reform. This amounts in absolute terms to no less than 20 to 25 million tonnes"* (Bach et.al. 2002).[16]

An even better example is London's congestion charge (see Box 3). In this case, the project activity would be the definition of the concept and the implementation of the London Congestion Charging Scheme. Within the implementation of this policy tool, **participants** included not only authorities like the Mayor of London, but also companies like Transport for London (TfL) as the responsible implementation agency. The present **boundary** of the congestion charging zone is sometimes referred to as the London Inner Ring Road, including the whole City of London, the City's financial district and the West End. This area covered by the instrument equals 1.3% of Greater London. In September 2005, the western extension of the congestion charging zone was confirmed and will come into force in February 2007. In CDM terms, the project boundary would be defined as the GHG emissions from the vehicles moving within the charging zone. The project would have to account for leakages such as increased emissions outside the charging zone caused by drivers taking detours to avoid the charge. A further challenge would be to differentiate between emission reductions that have been caused by the charge and reductions due to other factors such as spikes in fuel prices or significant improvements in car efficiency such as those aimed at by the ACEA Agreement.

Since its implementation, a number of reports about the instrument's efficiency have been published showing significant changes compared to the baseline scenario. Monitoring of the central London congestion charging scheme undertaken by TfL is based on counting the number of cars entering and leaving the zone and assuming an average emission factor. In order to continuously assess the effects of the scheme there is an extensive monitoring programme in place, which consists of over 100 survey and research activities to complement the already existing monitoring carried out in London. It has shown a reduction in fuel use and $CO_2$ emissions of 20 and 19% respectively within the charging zone (TfL 2005). Since its introduction, the number of cyclists entering the charging zone during charging hours has increased by about 19% and there is additional evidence that walking has also increased. As stated in the Environmental Assessment report (TfL 2005), the number of people who have transferred from driving into the charging zone to either cycling, walking, riding a motorcycle, using a taxi or car sharing, is forecast to be between 5,000 to 10,000. As estimated in the Mayor's Transport Strategy, the expected emission reductions of the scheme are predicted to cut central London's traffic levels to "summer holiday level" all year.

Economic instruments can be found at the local as well as at the national level. As the example of London shows, it is clearly feasible to evaluate the effects on the municipal level. However, the broader the scope of the instrument is, the more uncertainties occur. Reasons which encourage people to use private cars less often are usually multifold, and economic instruments take effect indirectly. Even if surveys and statistical evaluation of the general fuel consumption give insight in the way instruments work, the assessment will be subject to uncertainties. Furthermore, the question of **additionality** is not easy to answer. In contrast to plans or regulations, economic instruments are less common at the local or regional level. Hence, the additionality of a congestion charge might be easier to justify than that of value-added taxes. Moreover, the high initial costs for implementing a congestion charging scheme may be a substantial barrier to implementation. But many economic instruments also yield financial benefits to the project participants even without generating CERs. A charge or tax leads to new financial sources for public authorities. This is also a threat for the **sustainability** of the activity as increasing prices, especially when they also affect public transport modes,

[16] The emission reductions reported are based on all sectors. This study does not show the specific effects in the transport sector.

may lead to problems for poor people to afford mobility. In order to serve future generations and the poor, a careful design of the instrument is required.

*Soft Policy Instruments*

As outlined in section 2, soft policies are often corporate policies or measures. If limited to a company as in the DHL example (see Box 4), initiatives such as eco-driving are not sectoral in scope but might in principle fit under the project CDM, even though the first attempt to develop a methodology for an eco-driving training project was not successful. The EB argued that emission reductions would not be directly attributable to the project activity, but driving behaviour does have a clear impact on GHG emissions.

There are more general schemes of soft policies that are closer to a sectoral, programmatic or policy-based approach. More policy-based schemes include mainly administrative actors. In these cases, defining the project and the methodology has characteristics and challenges similar to those elaborated above for regulations and economic instruments.

Taking a sectoral approach would, in the case of eco-driving, mean implementing a larger programme covering a number of decentralised training activities. The project boundary would cover all vehicles whose drivers take part in the training programme. To evaluate developments, it is necessary to collect data on driven kilometres as well as on the fuel consumption of the individuals. For instance, effects of eco-driving training on bus drivers who drive the same routes every day are relatively stable. Fuel consumption of the municipal vehicle fleets including waste transport vehicles have been monitored in Heidelberg (Dalkmann / Herbertz 2003).

Assessing the past development of driven kilometres and fuel consumption and developing a forecast by considering proposed vehicle fleet changes and market development without any change of driving determines the **baseline**. Demonstrating the **additionality** of the project could be difficult since reducing fuel consumption also reduces operating costs. The project participants would therefore need to demonstrate that there are barriers preventing the implementation of the programme, such as too high upfront costs. **Monitoring** can be organized by measuring kilometres driven and fuel consumption. Even if no transport is avoided and no modal shift is realized, the project would be **sustainable** in the sense that it would have no negative socioeconomic or ecological impacts, no jobs would be in danger and drivers would learn more about fuel-efficient driving and could use this knowledge for their private mobility.

### Table 3: Instruments as Measured against the CDM Criteria

| | Planning Instruments | Regulative Instruments | Economic Instruments | Soft Policy Instruments |
|---|---|---|---|---|
| **Project activity** | *Example: Strategic Environmental Assessment (SEA) in Local Transport Plans (LTP) in the UK;* Development of LTP and its implementation | *Example: ACEA voluntary agreement (VA) with the European car industry;* VA to reduce emissions from passenger cars (from 186 to 140 g $CO_2$ (1995-2008)) | *Example: London congestion charge;* Introduction of a congestion charge | *Example: Eco-driving training at DHL* Establishment of Eco-drive scheme and implementation |
| **Project participants** | Transport Administration, Environmental Administration, consultants | EC and ACEA, national EPAs for monitoring | Mayor, Public Administration; TfL | Government or company (DHL) |
| **Project boundary** | Vehicle emissions covered by the plan | $CO_2$ emissions from newly registered cars in Europe | Number of vehicles moving in charging zone, small leakage effect outside the boundary (charging zone) | Emissions from all vehicles driven by trained drivers |
| **Baseline** | Business-as-usual-scenario from SEA assessment | Scenario without implementation of regulation (growth from 380 Mt $CO_2$ (1990) to 536 Mt $CO_2$ (2010)) | Scenario without implementation of the measure | Scenario without implementation of the scheme has to be developed |
| **Additionality** | Plan needs to deviate from BAU scenario | Required by the EC due to climate change policy, target substantially below BAU | Measure implemented due to environmental and access-related reasons | Economic barrier, need for initial investment (driving time barely increased) |
| **Monitoring** | Transport surveys and further SEA indicators/data | Evaluation by national EPAs based on industry information (average fuel consumption of cars sold) (35 Mt $CO_2$ savings (1995-2003)) | Ongoing evalua-tion, emissions calculation based on number of cars entering and leaving the charging zone and an average emission factor | Ongoing evaluation measuring km driven and fuel consumption |
| **Emission reduction** | Difference between baseline and actual emissions | Savings forecast: 85 Mt $CO_2$ | 30% reduction in congestion, 20% reduction in $CO_2$ emissions | Results from difference in fuel consumption before and after training (10% reduction in diesel consumption of eco-driving vehicels) |
| **Contribution to SD** | Emission savings by consideration of environmental effects when developing new LTP | Distribution of clean technology with less emitting vehicles | Less emissions by reduced congestion; strengthening public transport through investments with money from charge | Savings in fuel consumption and $CO_2$ emission. Knowledge gained by training can be used outside the job |

Source: Own analysis

# 6 Conclusions and Outlook

The Kyoto Protocol with its CDM provides a way to encourage industrialized countries to foster climate-friendly projects in developing countries. However, while the CDM in general is currently expanding rapidly, transport is so far hardly represented in the CDM project portfolio. One of the main reasons for this discrepancy seems to be the high complexity of transport projects which render methodology development difficult. It has to be noted, though, that the CDM is still a relatively new instrument and problems of complexity are not unique to the transport sector. Further projects may yet find ways to overcome the methodological problems. From this perspective, the current underrepresentation of transport projects may be an expression of typical start-up difficulties rather than an indication of fundamental problems.

Browne et al. (2005) have suggested that sectoral approaches to the CDM might provide a more fitting framework for transport projects. They might on the one hand be better able to deal with the methodological challenges and on the other hand able to incorporate activities or strategies that cannot be defined or implemented in a restricted local context, such as spatial or transport planning.

The discussion has shown that it is in fact possible to design programmatic or policy-based sectoral transport activities within clear project boundaries. The main stakeholders surrounding such activities would be administrators and politicians, but in some cases also corporate stakeholders such as managers or representatives from industry associations. Transport policies take place at different administrative levels; the municipal and regional levels seem to be the most appropriate for CDM activities. Planning and some soft policy instruments are related to the programmatic CDM, while regulations, economic instruments and several soft policies pertain more to a policy-based CDM. Policies as such are currently not eligible to be registered as CDM projects. However, the recent guidance of the EB on programmatic projects allows for programmes that *implement* a policy. Implementing the instruments discussed in this paper as CDM projects may therefore not have to wait for changes to the CDM rules that would allow for the establishment of a policy to be eligible for the CDM.

Transport research yields several tools to address the methodological requirements of the CDM. Methodological parallels can be found especially in the application of SEA to a spatial or transport plan on various levels (local to national). In SEA, an assessment of a status quo scenario as well as a business-as-usual scenario is required, which would be the CDM baseline, and the potential effect of the proposed measures, including potential GHG emission reductions, is calculated. In addition, the preparation of monitoring is obligatory within SEA procedures.

However, similar to all forecasts, the models and assessments are connected to a certain level of uncertainty and depend on a set of assumptions introduced by the participants. Scaling the CDM up to a more sectoral level to include measures such as those discussed in this paper would therefore further increase the complexity of projects and the uncertainties surrounding baseline development, project monitoring, and the emission reductions achieved. Sectoral approaches are therefore not "better" for transport than the current CDM in the sense of reducing the methodological difficulties that currently plague transport projects in the CDM. The advantage of sectoral approaches could instead be to scale activities up to a level that is equal to the scale of the challenge faced in redirecting transport into a more sustainable direction.

However, the resulting increased uncertainties are problematic since each CER generated through the CDM will be used to allow one more tonne of GHG emissions in the industrialized countries to be emitted. CERs that have resulted from faulty emission reduction documentation therefore lead to an increase in GHG emissions globally. Hence on a global scale, not conducting a CDM project activity is preferred over a falsely calculated CDM project.

Policy makers face a difficult decision in order to encourage emission reductions in the transport sector. They could decide that the CDM is not suited to implement projects that operate in a complex context and that a sectoral approach too much exacerbates the methodological difficulties that a transport CDM project faces and instead look at ways other than the CDM or a sectoral approach to the CDM to bring about structural change in the infrastructure of countries of the global South. Alternatively, policy makers may want to continue to strengthen the transport sector in the CDM project portfolio through sectoral approaches. In this case, the CDM as a tool to use by countries of the global South has to be further developed. One option could be to find ways to quantify the uncertainties that transport projects face and discount the CERs depending on the probabilities that have been calculated. Another way to deal with the uncertainties could be to use highly conservative measures when calculating the baseline and tend towards a less optimistic forecast of emissions. In addition, projects could be subjected to a rigorous ex-post assessment to clearly determine which part of the emission reduction measured is due to the project activity and which part is due to other factors. Finally, it could be a principle of sectoral approaches that there has to be a certain buy-in or co-financing from the host countries in the sense that not all emission reductions are going to be credited. In this way, what is currently at best a zero-sum game as regards the climate, since each emission reduction in the global South is going to lead to an equivalent emission increase in the North, could be transformed into an engine for actual net emission abatement.

A sectoral CDM should in principle be able to complement rather than supplant the current CDM. In particular, there is no reason why areas not covered by sectoral projects should not be open to local projects. In cases where an area is also addressed by a sectoral project, the number of CERs issued to the local project could be deducted from the amount of CERs issued to the sectoral project to prevent double counting. The double counting problem might also arise if there was more than one sectoral project in a country. The linkages between projects would therefore need to be examined for each particular case.

Additional research is needed to further examine the potential role of the CDM in transport policy. Studies need to examine to what extent the CDM can be a stimulus for introducing ambitious sustainable transport measures at a local level. Another issue that can be addressed by further policy research pertains to the question of how a sectoral CDM would fit into the overall climate regime. Taking into consideration that sectoral projects can be expected to yield significant amounts of CERs, this might encourage industrialized countries to adopt stricter emission targets in future commitment periods than it would otherwise be the case. This would be another way for a sectoral CDM to actually produce a net climate benefit. However, if industrialized countries do not adopt ambitious targets post-2012, a sectoral CDM delivering large amounts of CERs could easily extinguish any domestic emission reduction efforts by industrialized countries.

If a sectoral approach is considered by policy makers, the existing capacity to carry out such projects in countries of the global South needs to be examined. Training local staff may not only help to increase the number of rigorous CDM projects proposed, both in the existing and in a sectoral CDM framework, but also support further building capacity to plan, implement and monitor transport policy and infrastructure developments that set global transport on a sustainable path.

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**This Policy Paper is a contribution of Holger Dalkmann, Wolfgang Sterk, Daniel Bongardt, Bettina Wittneben and Christian Baatz to the political discussion.**

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# Annex: Overview of Transport Methodologies Submitted to the CDM Executive Board

| | Modal Shift (private sector) | | | Efficiency Imp. (+ Modal shift) | | Efficiency I. | Fuel Switch |
|---|---|---|---|---|---|---|---|
| | Change from road to sea transport | Change from road to pipeline transport (SmallScale) | Cosipar Transport Modal Shift Project | Transmilenio – urban mass transportation system | BRT project, Mexico | Behaviour-oriented demand-side EE program (SmallScale) | Biolux Benji Biodiesel Beijing Project |
| **Method N°** | NM128 | SSC58 | NM201 | NM52 / NM105 | NM158 | SSC41 | NM180 |
| **Country** | Brazil | India | Brazil | Colombia | Mexico | Thailand | China |
| **Main Characteristics** | - Idea: increasing transportation efficiency<br>- Aim: switching from road to a less emission intensive transportation mode<br>- NM0128 + NM0201: transport of feedstock by barges instead of trucks<br>SSC58: transport of feedstock by pipeline/ship instead of truck/ship | | | - Aim: introduction of BRT system for main bus routes<br>- Emission reduction through:<br>1. improvement of the bus fleet by substituting old buses<br>2. reduction of idling time<br>3. induction of modal switch from private vehicles to buses | | - Training of drivers promoting behavioural changes for energy efficient operation of vehicles | - Production and sale of biodiesel produced from waste cooking oil (see also below) |
| **Main Meth Panel / EB criticism** | - A static baseline is used<br>- Transportation emissions are not linked to plant output<br>- Return trips are not addressed<br>- Flawed proof of additionality | | - Not yet assessed | *<br>- Baseline scenario probably will not represent GHG emissions in the absence of the project<br>- A static baseline is used<br>- Project-specific proof of additionality without providing a method<br>- Questionable assumptions used (e.g. that "rebound effect" is negligible) | | - not eligible in principle since measured emission reductions are not directly attributable to the project activity | - Not yet assessed |
| **Expected CERs** | 63,799 | 63,210 | 47,172 | 3,332,859 | 181,209 | - | 123,211 |
| **Stage of Approval** | Method Not Approved | Method Not Approved | Method U. Consideration | M. Approved, Project Under Validation | Method Not Approved | Method Not Approved | Method Under Consideration |

* Indicated difficulties only hold for the methodologies NM52 and 158.

| Fuel Switch | | | | | | |
|---|---|---|---|---|---|---|
| | Switching fossil fuels from petro-diesel to biodiesel in transport sector | Transportation bio-fuel production with life-cycle-assessment | Khon Kaen fuel ethanol project | Palm methyl ester biodiesel fuel production for transport using LCA | "A road transport sector fuel switching project" (LPG retail outlets for cars) | Emission reductions by low-greenhouse gas emitting vehicles (Small Scale) |
| **Method N°** | NM69 / NM108 | NM109 / NM129 | NM82 / NM185 | NM142 | NM83 | AMS-III.C. |
| **Country** | India | Thailand | Thailand | Thailand | India | India |
| **Main Characteristics** | - Idea: substitution of conventional diesel or petrol through less emission-intensive fuel, mainly biofuel<br>- Aim: cultivation of energy plants, production and distribution of biofuel<br>- Assumption: biodiesel is "carbon neutral" and substitutes conventional diesel in motors, in consequence GHG emissions are avoided | | | | Substitution of conventional diesel through less emission intensive LPG | Substitution of conventional vehicles through low-greenhouse gas emitting vehicles |
| **Main Meth Panel / EB criticism** | - Wrong (or no) assessment of decrease/increase of "carbon pools" due to project activity or in the absence of the project<br>- Adoption of (LCA) emission factors not applicable to the project<br>- Incorrect treatment of leakages concerning:<br>• possible export of biofuel to Annex I countries<br>• $N_2O$ emissions due to application of fertiliser<br>• change in fuel efficiency due to use of biodiesel | | | | - Baseline scenario overestimates GHG reductions achieved by the project activity<br>- Monitoring methodology is not adequate | - |
| **Expected CERs** | 120,696 | 442,170 | 401,960 | 2,177,550 | 2,542,723 | 59,000 |
| **Stage of Approval** | Method Under Consideration | Method Under Consideration | Method Under Consideration | Method Under Consideration | Method Not Approved | Method Approved Project under Validation |