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Solving Methodological and Institutional Problems for CDM Transport Projects: Key for Increased Mitigation Action or Love's Labour's Lost?

Hanna Wang-Helmreich

Deutsche Zusammenfassung

22% der globalen CO_2-Emissionen gehen auf die Verbrennung von Kraftstoffen zurück. Damit ist der Verkehrssektor einer der Hauptemittenten von Treibhausgasen (IEA 2010). Bisher hat der CDM kaum Emissionsreduktionen in diesem Sektor hervorgerufen: Derzeit gibt es erst 10 registrierte CDM-Verkehrsprojekte. Dies ist zum einen auf die Heterogenität und Komplexität des Verkehrssektor zurückzuführen, welche die Messung von Emissionen schwierig machen. Darüber hinaus werden jedoch unter anderem auch die methodischen Anforderungen für Verkehrsprojekte im CDM kritisiert: Sie sollen über die Maße kompliziert und restriktiv sein (UNFCCC 2011e).

Das vorliegende Kurzpapier gibt zunächst einen Überblick über CDM-Projekte und -Methoden im Verkehrssektor. Im Anschluss daran werden einige der Haupthindernisse für CDM-Aktivitäten im Verkehrssektor präsentiert, die auf einem Praktiker-Worshop der UNFCCC zur Verbesserung von CDM Methoden im Verkehr identifiziert worden sind. Diese beziehen sich einerseits auf methodische Probleme beim Nachweis der Zusätzlichkeit von Projektes, bei Anforderungen für Leckagen und Monitoring-Umfragen, andererseits auf institutionelle Schwächen, welche die Durchführung von CDM-Projekten im Verkehrssektor zeitaufwendig und teuer machen.

Darüber hinaus werden in diesem Papier Möglichkeiten und Grenzen diskutiert, die Nutzung des CDM im Verkehrssektor auszuweiten. Das Papier schließt mit einem kurzen Ausblick auf die Emissionsreduktionsmöglichkeiten, die sich aus dem neu aufkommenden Mechanismus der Nationally Appropriate Mitigation Actions (NAMAs) ergeben.

1 Introduction

With a share of 22% of global CO_2 emissions resulting from fuel combustion, the transport sector is one of the major contributors to global greenhouse gas (GHG) emissions (IEA 2010). However, with only ten registered project activities, the Clean Development Mechanism (CDM) has so far hardly been able to reach this sector. While low-carbon transport projects have substantial social, economic and environmental benefits such as improved air quality, alleviated congestion and improved road safety, they generate only relatively small amounts of Certified Emission Reductions (CERs) compared to the required efforts to implement them. This is partially caused by the heterogeneity and complexity of the transport sector, which comprises a large amount of small mobile units whose emissions are difficult to assess. Furthermore, methodological requirements are criticised for being unduly complicated and restrictive (UNFCCC 2011e).

After giving an overview of CDM projects and methodologies in the transport sector, this paper presents some of the key obstacles for CDM project activities in the transport sector identified during a UNFCCC practitioner workshop on the improvement of CDM methodologies for transportation. Moreover, opportunities and limitations for fostering CDM transport projects are discussed. The paper closes with a spotlight on the newly developing instrument of Nationally Appropriate Mitigation Actions (NAMAs) and the opportunities for emission reductions resulting from this instrument in the transport sector.

2 Overview of CDM Transport Projects and Methodologies

As of November 2011, 3,586 CDM projects were registered with the UNFCCC and have led to the issuance of a total of 778,766 million CERs (UNFCCC 2011b). However, the share of transport projects in terms of both number of projects and number of CERs is negligibly small: Among the registered CDM projects, only 10 are transport projects (0.24%) (UNFCCC 2011c); so far, they have generated only 359 thousand CERs equalling 0.046% of all CERs issued until November 2011 (UNEP Risoe Centre 2011) (for comparison: transport has a share of 22% of global CO_2 emissions resulting from fuel combustion (IEA 2010)).

This, however, does not result from a lack of transport methodologies: Currently, twelve of the total of 190 approved CDM methodologies are linked to the transport sector (UNFCCC 2011d). Further transport methodologies are under development. The approved methodologies can be divided into three different categories: 1) fuel switching from conventional to less emission-intensive fuels or biofuels, 2) vehicle efficiency improvements within one transport mode and 3) modal shift.

Table 1: Approved CDM Methodologies Linked to Transport

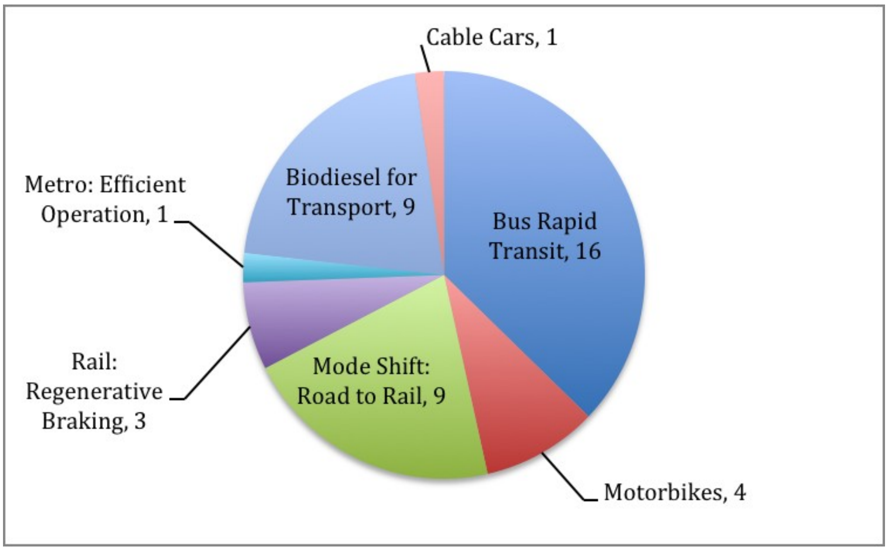
Fuel Switch	Energy Efficiency	Renewable Energy
Emission Reductions by Electric and Hybrid Vehicles (AMS-III.C.)[1]	Baseline Methodology for Bus Rapid Transit Projects (AM0031)[2]	Biodiesel Production and Use for Transport Applications (AMS-III.AK.)[3]
Introduction of Low-emission Vehicles / Technologies to Commercial Vehicle Fleets (AMS-III.S.)[4]	Modal Shift in Transportation of Cargo from Road Transportation to Water or Rail Transportation (AM0090)[5]	Introduction of Bio-CNG in Transportation Applications (AMS-III.AQ.)
Plant Oil Production and Use for Transport Applications (AMS-III.T.)[6]	Baseline Methodology for Mass Rapid Transit Projects (ACM0016)[7]	
Cable Cars for Mass Rapid Transit System (MRTS) (AMS-III.U.)[8]		
	Transportation Energy Efficiency Activities Using Retrofit Technologies (AMS-III.AA.)[9]	
	Transport Energy Efficiency Activities Using Post-fit Idling Stop Device (AMS-III.AP.)	
	Transportation Energy Efficiency Activities Installing Digital Tachograph Systems to Commercial Freight Transport Fleets (AMS-III.AT.)	

Source: UNFCCC 2011d.

In the entire CDM project pipeline, the share of transport projects is only slightly larger: Of the 7,088 projects in the CDM pipeline, 43 (0.6%) are linked to the transport sector (UNEP Risoe Centre 2011). While 37% of all transport projects in the CDM pipeline are bus rapid transit (BRT) projects, there are also several projects related to the use of biodiesel and mode shift from road to rail (21% each). In addition to the transport CDM projects, there is also a Programme of Activity (PoA) related to the scrapping of old vehicles (UNEP Risoe Centre 2011).

[1] Displacement of more-GHG-intensive vehicles.
[2] Displacement of more GHG-intensive transportation modes.
[3] Dispalcement of more-carbon-intensive fossil fuel for combustion in vehicles / transportation applications by ues of renewable biomass.
[4] Displacement of more-GHG-intensive vehicles.
[5] Displacement of a more-carbon-intensive transportation mode.
[6] Displacement of more-GHG-intensive petrodiesel for transport.
[7] Displacement of more-GHG and, if gaseous fuels are used, CH4-intensive transport modes (existing fleet of buses operating under mixed traffic conditions) by less-GHG intensive ones (newly develop rail-based systems or segregated bus lanes.
[8] Displacement of more-GHG-intensive vehicles.
[9] Energy efficiency measures in transportation reduce GHG emissions due to decreased fuel consumption.

Figure 1: Sub-types of CDM Projects in the Transport Sector



Source: Own illustration based on UNEP Risoe Centre 2011.

3 Lessons from a Transport Workshop: Key Obstacles for CDM Project Activities in the Transport Sector and Possible Solutions

As discussed at the UNFCCC practitioner workshop mentioned above, incentives for CDM projects in the transport sector are relatively small because in general, few CERs are generated compared to the efforts required during the project cycle. Furthermore, revenues from CERs usually only account for a minor share of total investment costs of transport projects. The low CDM revenues for transport projects are further reduced because of high upfront costs for the application of CDM methodologies in the transport sector. On the one hand, these costs result from the challenges arising for measuring, reporting and verification (MRV) of the numerous, heterogeneous and small sources of emissions in the transport sector, where necessary (e.g. modal shift projects). On the other hand, many requirements of CDM transport methodologies were criticised by workshop participants for being unnecessary and unduly restrictive.

The main topics of criticism related to additionality demonstration, leakage, monitoring surveys as well as delays in validation and registration and a lack of expertise, especially in Designated Operational Entities (DOEs). The institutional and methodological problems criticised by workshop participants were said to cause high costs for transport projects. Project developers alerted the workshop participants that this was especially problematic for small transport projects that could not be realised because the costs were too high.

3.1 Key Methodological Problems

In general, project developers stressed the importance of balancing the complexity of transport methodologies necessary to ensure environmental integrity on the on hand and clarity as well as usability on the other hand. Thus, project developers criticised that transport methodologies generally lacked usability as they were highly complex. On the other hand, transport methodology AMS-III.C for Emissions Reductions by Electric and Hybrid Vehicles, for example, which only has eight pages, was criticised for being too simple. Project developers stated that the lack of clarity and detail of this methodology led to confusion and lengthy discussions between project developers and the DOE in the registration process. Project developers had to prove to DOEs that they actually did fulfil the methodology's requirements because DOEs were unsure what they should do.

Besides these topics and general question of balancing complexity and clarity, the major issues discussed at the practitioner workshop centred on additionality determination, requirements for the determination of leakage emissions and monitoring surveys.

3.1.1 Additionality Demonstration

Additionality demonstration is one of the key challenges in any CDM methodology. Especially regarding this issue, project developers argued that rules for CDM projects had to be adapted if the UNFCCC wanted transport to play a role in the CDM.

At the UNFCCC workshop one of the project developers stated that the CDM Executive Board has reduced additionality demonstration to assessments of the internal rate of return and hardly ever acknowledged the relevance of other barriers. However, revenues from CERs usually only account for a minor share of total investment costs of transport projects. Thus, it is very difficult for transport projects to pass an additionality test that only considers financial parameters (Grütter 2011).

Further problems for CDM transport projects result from definitions of common practice. A common practice analysis is one of the steps in the demonstration of additionality. It assesses the number of similar projects that exist in comparable project contexts without the CDM. Workshop participants at the UNFCCC workshop on transport methodologies criticised that the assessment of common practice did not consider differences between, e.g., European and African countries. For example, in ACM0016 on Mass Rapid Transit Projects, cities are divided into different categories according to their size. The categories distinguish between cities with more than one million inhabitants and cities with between half a million and one million inhabitants. For the common practice analysis, cities of each category are compared to all other cities of that size in the host country. If there is just one city with between half a million and one million inhabitants, then the geographical area has to be expanded to neighbouring countries until the set of comparison includes three cities. Mass rapid transit systems (MRTS) are considered to be common practice if they have already been implemented in 50% of the cities considered.

Project developers argued that in most developing countries, there is only one city of the relevant size. If the geographical area was expanded, frequently some kind of MRTS could be found in the region and projects could therefore not prove additionality with a common practice analysis, one of them said. One participant claimed that this part of the CDM methodology alone had excluded dozens of projects in several countries in

Latin America, Asia and Africa and argued that this type of common practice analysis was only adequate in countries like China and India which have numerous larger cities (Grütter 2011).

3.1.2 Monitoring Surveys

While fuel switch methodologies are relatively straightforward once the general uncertainties are resolved, especially projects aiming at modal shift require complex CDM methodologies to measure and assess people's transport behaviour (Dalkmann et al. 2007). For example, in the Baseline Methodology for Bus Rapid Transit Projects (AM0031), annual customer surveys are the basis for considering the alternative modes of people, induced traffic, fuel type, occupancy rate and trip length.

At the UNFCCC workshop, project developers complained that recording and evaluating this data requires substantial amounts of time and money and thus hampers project development. They stated that some of the information collected in surveys about drivers such as their place of residence and modal split did not change dramatically in short periods of time and therefore does not have to be recorded with the frequency required in the methodologies (Grütter 2011; Rodríguez 2011).

Also, project developers pointed to empirical evidence showing that over time the trip distance tends to increase autonomously in developing countries as a growing number of people have access to private cars. This, however, was not included in baseline calculations. Thus, project developers stressed that using old surveys was actually conservative and suggested to make them less frequent (Grütter 2011; Rodríguez 2011).

3.1.3 Leakage

In many CDM methodologies, leakage emissions have to be considered for emissions calculations. Leakage emissions are emissions that are caused by CDM project activities but take place outside of the project boundary.

At the practitioner workshop, project developers criticised that the requirement to determine the leakage effects of changes in the load factor of conventional busses and taxis and congestion in AM0031 and ACM0016 was costly and unnecessary as in practice they were negligible or even positive (Rodríguez 2011). Project developers stated that each survey costs 30,000 US$ (Grütter 2011). Today, for compliance with AM0031, occupation rates of conventional busses and taxis have to be measured every three years. Project developers pointed out that market forces most likely eliminated the impact of a BRT project on the load factor: if, e.g., a taxi does not have enough passengers, it is likely to stop operating instead of operating with less customers. Thus, collecting data on the number of, e.g., taxis would suffice and the load factor would not have to be measured. These findings were backed up by project developers with empirical data from Bogota and Seoul where occupation rates of taxis hardly changed after a CDM project was implemented (Grütter 2011).

Regarding the inclusion of leakage emissions from congestion change as contained in AM0031 and ACM0016 which is to include emissions that can (inter alia) result from increased vehicle speed, project developers stated that speed and congestion impacts tended to eliminate each other. They claimed that empirical evidence showed that this impact was marginal in most cases or even negative and stated that eliminating the leakage of congestion was thus conservative (Grütter 2011).

Furthermore, project developers claimed that the rebound effect was not included in methodologies for other sectors and the inclusion in transport methodologies was thus unfair. They claimed that unnecessary costs resulted from the inclusion of these leakage emissions for transport projects.

3.2 Institutional Problems

Other major obstacles to the development of CDM projects in the transport sector result from institutional shortcomings. At the UNFCCC workshop, criticism was aired on the lack of expertise on transport issues at all levels in the project development cycle, as well as on delays in validation, registration and verification. These factors increase the time and money necessary for project implementation.

Increased costs result, inter alia, from the time consumed during the registration process. Project developers stated that DOEs frequently took between one and three years to complete validation (Grütter 2011). The availability and response time at verification was also criticised by project developers (Rodríguez 2011).

Besides the pressure of work, one of the reasons for delays in the registration process was seen to result from the lack of competence and experience of DOEs in transport issues (Grütter 2011; Rodríguez 2011). Project developers stressed that attempts to transfer experiences from e.g. hydro dam to transport projects were doomed to fail as the characteristics of transport projects are quite unique (Grütter 2011). Therefore, explicit capacity building on transport issues for DOEs and other actors involved in the CDM project cycle is required.

Further complications for transport projects are seen in their treatment by the DOEs, which are said to be unduly restrictive with transport projects. Project developers assumed that this was partly because UNFCCC requirements were very restrictive in the transport sector (see section on methodological problems above for details) and DOEs were unsure how to comply with UNFCCC transport requirements. Also, the DOE process was said to be prolonged because the EB continuously changed the rules for CDM projects and projects had to adapt to these changes over and over again. Project developers complained that DOEs charged two to three times more for transport projects than for CDM projects in other sectors (Grütter 2011).

3.3 Possible Solutions Suggested by Workshop Participants

In general, workshop participants stressed that stakeholders in transport were close to being too frustrated to undertake any more activities related to the CDM if the current situation was not to change quickly. Therefore, they made several suggestions to improve methodologies and institutional settings.

Regarding **additionality demonstration,** they suggested to change the common practice analysis to make it indicate whether a technology is widely and commonly used in the target city (share of public transit in motorised trips, share of MRTS in motorised trips) instead of comparing larger urban zones as it is done in ACM0016 (Grütter 2011). The Methodologies Panel did not follow this suggestion, but, in its meeting in August 2011, has in fact presented a draft revision of ACM0016 (Version 03.0.0) which includes a change of additionality demonstration for MRTS: Instead of identifying alternative scenarios and doing investment and common practice analyses, the Methodologies Panel suggests all MRTS in least developed countries (LDCs) to be automatically additional while other countries have to follow a demonstration of additionality that takes account of the criticism aired by project developers to some extent (UNFCCC 2011a).

Further suggestions regarding CDM transport methodologies centred on **monitoring surveys.** In general, project developers suggested to make them less frequent (Grütter 2011; Rodríguez 2011). Furthermore, they proposed to remove some elements from monitoring surveys such as the gender specific questions and claimed these were irrelevant for determining emissions. Especially for small scale projects, workshop participants suggested to adjust monitoring requirements keeping in mind the relation between resource costs and the level of accuracy achieved (Spors 2011). Considering the input from the practitioner workshop as well as online submissions, the Methodologies Panel's draft revision of ACM0016 (Version 03.0.0) includes a reduction of monitoring surveys as well as key monitoring requirements aiming to ease the problems described (UNFCCC 2011a).

Concerning requirements for the consideration of **leakage emissions,** project developers suggested to eliminate surveys regarding the leakage effects of changes in load factors and congestion change from methodology AM0031 and ACM0016. Furthermore, they asked for the same treatment of the rebound effect in methodologies of different sectors.

Also regarding the **institutional problems** described workshop participants made suggestions. While one highly provocative suggestion to solve the problem of delays in the registration process was to suspend DOEs that, e.g., took more than one year for validation (Grütter 2011), other suggestions centred on guidance and training on transport issues. These were seen to be necessary on different levels for validators as well as for consultants and NGOs. First of all, workshop participants stressed that general guidance on transport issues for DOEs was required.

Further suggestions to increase opportunities for CDM transport projects centered on simplifying CDM methodologies with **standardised approaches.** Project participants stressed that the smaller a problem, the simpler to use the methodological requirements regarding the issue should be. They suggested the use of very conservative global factors for very small emissions without monitoring and verification etc. This was seen to be necessary especially where costs for calculations exceed CER revenues. Participants pointed out that if project developers really wanted a less conservative approach to get more credits, they could still use project specific data.

Further suggestions by workshop participants included to conservatively extrapolate data after collecting a small amount of relevant data (speed etc.). In general, good data was seen as one prerequisite for simplifying transport methodologies. However, workshop participants pointed out that data availability was a problem, especially in developing countries in Africa, and that some of the default values used are actually outdated. Thus, they suggested to **coordinate data gathering and model selection** and to combine them with existing data as to generate more default values. Default values employed by private sector companies were mentioned as another possible source for standardisation. They did not specify on who should be responsible for such a co-ordinated approach.

Also, workshop participants pointed out the need to spread and transfer existing information, models and technology for generating data and default values. Regional databases should be created. To catalyse their development, a good coordination process was deemed to be essential which could be triggered by regional workshops, bringing together information and identifying gaps. In addition, the CDM Methodologies Panel encouraged workshop participants to organise themselves the way the cement industry did which coordinated their suggestions and presented them to the CDM Executive Board with one single voice. Such an association in the transport sector would also be helpful in the training of transport experts, the organisation of workshops, as well as data collection and the definition of default values and benchmarks.

4 Conclusions and Outlook

While some of the criticism voiced by project developers at the practitioner workshop is clearly justified, some of the suggestions should be observed cautiously. In general, it is important to note that requirements for CDM methodologies have to be strict as to be able to guarantee environmental integrity of the CDM. As CERs are used to offset emissions in industrialised countries, otherwise the CDM would lead to an actual increase in global emissions.

Nevertheless, the institutional problems brought forward during the practitioner workshop clearly put an extra and unnecessary burden on project developers and should be addressed. A DOE taking three years to validate a project is clearly too long and it is very likely that lack of expertise on transport issues in DOEs and the EB's support structure is a real issue. Also the criticism regarding what is a proper comparison for the common practice analysis is justified. How to adapt common practice analysis should be considered carefully. The comparison with other cities seems to be a relevant indicator for a common practice analysis and could, for example, prevent MRTS from becoming CDM projects in cities that are laggards concerning the introduction of a MRTS in a country or region.

Furthermore, the amount of surveys required in some transport methodologies does indeed seem excessive. A manual including guidance on necessary analysis and information on how to deal with seasonal changes etc. could produce relief and offer opportunities to replace some of the information that is so far gathered by surveys.

Concerning the project developers complaints about methodologies demanding far more from transport projects than from projects in other sectors, evidence can indeed be found by, e.g., comparing requirements for baseline construction or the treatment of the rebound effect for renewable energy and transport projects. Thus, while they are treated in detail for transport methodologies, they have been ignored or only included with much less requirements in other sectors (Millard-Ball / Ortolano 2010).

Standardisation in CDM Methodologies

Also, the use of (more) default factors, (dynamic) emission intensity benchmarks and standardised baselines and additionality determination could lift some of the burdens that exist for transport projects. While the development of such tools causes high upfront costs, they can significantly reduce transaction costs in the long term and lead to more objectivity in determining baseline emissions and additionality. For standard setting, it is vital to have a good data basis. Especially in many developing countries, however, data availability is (extremely) limited – and even more so in the transport sector. Hence, coordinated data gathering and processing as suggested by workshop participants does indeed play a key role in standard development (Eichhorst et al. 2010).

Yet due to the heterogeneity and complexity of the transport sector, it is much more difficult to standardise elements of current CDM methodologies in the transport sector than it is, e.g., in the energy sector. To determine emissions in transport, various parameters related to the total transport **a**ctivity (in person- or tonne-kilometres) (A), the modal **s**tructure (S), the energy **i**ntensity of each mode (in MJ per person- or tonne-kilometre) (I) and the carbon content of the **f**uel used (F) have to be considered (ASIF framework; Schipper et al. 2000). For standardisation, the high diversity of the transport sector makes it necessary to choose relatively small geographical scopes (Spain and the European Commission 2010). Generally, standardisation is most promising for parameters relating to energy intensity and fuels (Eichhorst et al. 2010).

While CDM methodologies already employ several default values for fuel emissions and fuel consumption, so far, most data required is project specific. However, at least for BRT projects, analysis has shown that it is not possible to set benchmarks as it is difficult to aggregate the indicators necessary for the calculation of baseline emissions. Thus, for example, the modal structure of a city, which is an essential element of BRT baselines, cannot be transferred to another city. Both local factors such as local transport policy and the urban structure as well as individual factors on the demand side like age and income determine the modal structure of a city (Eichhorst et al. 2010). Thus, for factors not related to fuel and vehicle emission intensity, it may not be possible to significantly simplify CDM methodologies in the transport sector through standardised baselines.

A further problem arises from the necessity of constant updates for standardised baselines. Especially in many newly developing countries, dynamics in the transport sector of individual cities are extreme. It is doubtful whether efforts necessary for updating baselines in such cities would be lower than those for project specific data gathering (Eichhorst et al. 2010). This is, however, also a question of who would have to bear the burden of the efforts: While project specific data would most likely have to be gathered by project developers, the updating of standardised baselines might well be carried out by public entities.

The CDM may play a more prominent role for emission reductions in the transport sector if the existing institutional and methodological challenges and barriers were removed. In doing so, however, it is of essential importance not to jeopardise the environmental integrity of the mechanism.

Increasing the Scope – Nationally Appropriate Mitigation Actions

However, even if all of the obstacles described by workshop participants could be removed, the CDM still concentrates on individual projects with local, confined impacts on GHG emissions. To reach the large-scale transformational processes that are necessary to reach the 2°C – or the 1.5°C – target, greater efforts will have to be made. The development of programmatic approaches (Programmes of Activities (PoAs) which may include an unlimited number of CDM Programme Activities (CPAs) may increase the scope significantly.

Furthermore, hopes are high that the newly evolving instrument of Nationally Appropriate Mitigation Actions (NAMAs) will enable the transport sector to contribute the required amount of emission reductions. At the moment, it seems that NAMAs are likely to be defined as any kind of activity that reduces greenhouse gas (GHG) emissions in developing countries. This opens vast possibilities for NAMAs – also concerning sources of funding. While the CDM draws its sources from the private sector, NAMAs are likely to be financed by host country governments and international donors, too. They may thus consist of more policy-based approaches and include comprehensive packages aiming at the transformation of the entire transport system of a city, region or country. Such a sector-wide approach could also substantially simplify MRV. Instead of trying to determine the impact of individual actions, MRV of sector-wide NAMAs could take place on the basis of a sectoral inventory, which is relatively easy to establish in the transport sector based on fuel sales.

Whether or not NAMAs will fulfil the hopes pinned on this newly evolving mechanism largely depends on future developments and decisions of international climate negotiations as well as on national politics and on-the-ground work. Only counting on the CDM for emission reductions in the transport sector will not be enough to evoke the large-scale emission reductions necessary – even more so if options for methodological adjustments and improvements on the institutional level are not realised.

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Contact:

Hanna Wang-Helmreich

Tel. +49-(0)202-2492 284

Email: hanna.wang-helmreich@wupperinst.org

Wuppertal Institute for Climate, Environment and Energy GmbH
Döppersberg 19 - 42103 Wuppertal - Germany

The Wuppertal Institute is carrying out the “JIKO”-project on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

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