

A series of four concentric, semi-circular arcs in shades of green, starting from the left edge and curving towards the right, creating a sense of movement and depth.

FINANCING CLIMATE CHANGE MITIGATION: TOWARDS A FRAMEWORK FOR MEASUREMENT, REPORTING AND VERIFICATION

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and Kate M. Larsen (IEA)
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Jan Corfee-Morlot, Bruno Guay (OECD) and Kate M. Larsen (IEA)

The ideas expressed in this paper are those of the authors and do not necessarily represent views of the OECD, the IEA, or their member countries, or the endorsement of any approach described herein.

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in Autumn 2009 in response to the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UNFCCC). The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

The Annex I Parties or countries referred to in this document are those listed in Annex I of the UNFCCC (as amended at the 3rd Conference of the Parties in December 1997): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States of America. Korea and Mexico, as OECD member countries, also participate in the Annex I Expert Group. Where this document refers to “countries” or “governments”, it is also intended to include “regional economic organisations”, if appropriate.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	6
1. INTRODUCTION.....	9
1.1 Aim and scope of the paper.....	10
2. TOWARDS A FRAMEWORK FOR MRV OF MITIGATION SUPPORT	11
2.1 UNFCCC system as a basis for MRV of mitigation support	11
2.2 Elements of an improved framework for MRV of mitigation support.....	11
3. OVERVIEW OF MITIGATION SUPPORT: WHAT FINANCIAL INFORMATION IS AVAILABLE?	15
3.1 Public support	15
3.1.1 Bilateral mitigation support as reported under UNFCCC	16
3.1.2 Global Environment Facility	17
3.1.3 Bilateral ODA and the OECD “Rio Markers” for climate change support	18
3.1.4 Export Credits.....	21
3.1.5 Multilateral development banks and specific climate change funds	23
3.2 Private and public-private financial support	24
3.2.1 Clean Development Mechanism.....	24
3.2.2 Foreign Direct Investment	27
3.2.3 Other private	29
3.2.4 Domestic and other public-private investment	29
3.3 Summary of financial flows.....	31
3.3.1 Public versus private support and leveraging	33
4. DISCUSSION: AN EVOLVING MRV FRAMEWORK.....	37
4.1 Complementary information sources	37
4.2 Strengths and weaknesses of key information sources	38
4.3 Moving from review to verification of mitigation support	39
5. CONCLUSIONS	40
REFERENCES	43
ANNEX I: OTHER RELEVANT DATA SOURCES	46
ANNEX II: LIST OF THE MITIGATION RELEVANT ODA PURPOSE CODES BY SECTOR	46
ANNEX II: LIST OF THE MITIGATION RELEVANT ODA PURPOSE CODES BY SECTOR	47
GLOSSARY	49

LIST OF TABLES

Table 1: Bilateral climate change related ODA, reported in CRS from 2003-2007 (constant 2007\$, million USD).....	20
Table 2: Current measurement and reporting of mitigation specific support	32
Table 3: Current measurement and reporting of mitigation relevant support.....	33
Table 4: Evaluation of quality/availability of existing mitigation support data.....	39

LIST OF FIGURES

Figure 1: Origins and types of relevant pathways for mitigation support.....	13
Figure 2: Support for developing country mitigation action.....	14
Figure 3: Bilateral ODA Commitments - by Sector (2003-2007): 104.7 Billion USD/year (average)	19
Figure 4: Official Long Term Export Credits by Sector (2002-2008): 31.2 billion USD/year (average)..	22
Figure 5: Estimated CDM Investments by Year	26
Figure 6: Foreign direct investment by sector to developing countries (2003-2005): 259 billion USD/year (average)	28
Figure 7: Share of domestic private and public investment and foreign investment in infrastructure in developing and transition economies, by type of infrastructure (1996-2006)	30
Figure 8: Estimated North-South mitigation relevant and mitigation specific investment flows: 2000-2007 (constant 2007 USD, millions)	34
Figure 9: North-South investment flows, mitigation specific and other mitigation relevant in 2007: total est. 314 billion USD.....	35
Figure 10: Shares of mitigation specific and mitigation relevant ODA, Export Credits and FDI to Developing Countries (average 2003 2005)	37

Executive Summary

A central feature of recent international negotiations on climate change is agreement to improve understanding, transparency and accountability about greenhouse gas mitigation actions and financial and technical support for mitigation. Notably the Bali Action Plan – agreed in 2007 – provides some evidence of international convergence on these issues. Yet there are several possible interpretations of relevant language in the Bali Action Plan with regard to the relationship between mitigation actions and mitigation support, and the extent to which each should be “measurable, reportable and verifiable” (MRV) (Paragraph 1(b)(ii)). There is general agreement among Parties that MRV applies to mitigation actions by both developed and developing countries, and to the provision of support in the form of technology, financing and capacity building. However the Bali Action Plan leaves open the question of who will provide resources for such “mitigation support,” to whom, as well as how to measure, report and verify relevant support and mitigation action. It is also unclear about the degree of linkage between mitigation actions and support, an issue which is topical in current negotiations.

Differences in interpretation of the Bali Action Plan should not preclude discussions about how to establish an MRV framework to monitor progress with respect to the provision of support in the form of technology, financing and capacity building (hereinafter referred to as “mitigation support”). This paper highlights existing knowledge and information about a range of different types of mitigation support and outlines a structure for consideration of a future framework for MRV.

Mitigation support in the form of technology, finance and capacity building may encompass both “mitigation specific” and “mitigation relevant” support, as well as private and public pathways of support. “Mitigation specific support” aims to achieve greenhouse gas mitigation in developing countries as its main objective; it may also target fulfilment of related reporting requirements. Mitigation specific financial support could also be defined to include public and/or private support pertaining to investment flows under the Clean Development Mechanism (CDM) under the Kyoto Protocol (KP).

“Mitigation relevant support” is defined to include funding for development in key sectors that will shape emissions in developing countries and thus mitigation potential. Relevant flows of support include, for example, bilateral and multilateral official development assistance in emission intensive sectors, such as energy, transport and/or water infrastructure, waste management, agricultural or forestry sector development. They also include collaborative research and development initiatives that may not target climate change per se (e.g. in the energy and agricultural sectors). Finally, private sector flows in those key sectors, in the form of foreign direct and domestic investment, are shaping the pace and profile of emissions in developing countries. It is important to note that “mitigation relevant” flows of support may have either a positive or a negative effect on GHG emissions.

Mitigation specific flows are shown to be relatively small relative to mitigation relevant flows but growing. In particular, the paper documents the large magnitude of mitigation relevant private and public sector flows (i.e. in sectors that will affect GHG emission trends over time) relative to mitigation specific support from both public and private sources (largely public other than CDM). For example, combining different data sets, this paper estimates mitigation specific financial support flowing to developing countries is estimated to be in the range of 8 - 53 billion USD in 2007.¹ This represents no more than one-sixth of the total estimated flows of 314 billion USD going to sectors relevant to mitigation in 2007.

¹ This figure excludes adaptation financial support and includes flows from both public and private origins.

The wide range of estimates for mitigation specific flows stems from questions about whether and how to account for the Clean Development Mechanism. In recent years CDM investments, which are largely private, are estimated to be 1.5 to 4 times greater than other public sources combined.

Further, experience under the Global Environment Facility (GEF) shows that public funding in the GEF has a leveraging ratio of about 7 (i.e. the GEF investment leads to a total investment that is roughly 7 times greater due to co-financing largely from the private sector). Both the estimates of large private financial flows under the CDM and the GEF co-financing from the private sector attest to the power of public-private partnerships and the importance of using limited public funds to leverage private sector financing for low-carbon investments.

Another important policy message from this analysis is the need for domestic policy frameworks to steer private investments across relevant sectors and, within each sector, towards projects fostering mitigation. Capacity building and financial support for mitigation will need to work with partner countries to establish national enabling environments to attract investment and to incentivise investment in low carbon development. Combining existing sources of information about private investment with those on public investment will inevitably provide a more accurate picture of the evolution of mitigation support and shed some light on trends in key mitigation endpoints (e.g. investment in renewable or other low-carbon energy technologies).

Regarding MRV of mitigation specific support, the current monitoring, reporting and review framework under the UN Framework Convention on Climate Change (UNFCCC) has a number of strengths and weaknesses that should be addressed if it is to be used as the basis for an expanded system in this area. Weaknesses include inconsistent and/or incomplete self reporting of financial support; infrequent reporting; limited and incomplete information on multilateral development banks and other non-UNFCCC funds; lack of primary data on financial flows under KP mechanisms (CDM); and lack of verification procedures.

A strengthened framework for reporting could be developed and layered into the existing system, e.g. through the National Communications tool. Data gaps and reporting frequency could be corrected through improvements in National Communication guidelines and the development of a common reporting format. The UNFCCC could also collaborate with other institutions to develop and draw on more standardised data from other sources and to assure that information across sources is comparable and publicly available. Potential partners in this area include the OECD Development Assistance Committee, UN Commission on Trade and Development (UNCTAD) and multilateral and regional development banks. A key would be to provide a monitoring system that covers not just public but also private finance in mitigation specific as well as mitigation relevant areas.

Regarding private flows of financing, these are shown to be a dominant source both in sectors relevant to mitigation and in mitigation specific activities. There are a number of different sources of data and information on these flows. For example, data on foreign direct investment (FDI) and foreign debt provide relevant information on the broad financial trends. FDI data allow tracking aggregated trends of flows from one country to another, and occasionally provide sector level detail of flows. Data on private investment in infrastructure (World Bank Private Participation in Infrastructure) allows tracking private investment trends in the highly mitigation relevant infrastructure sectors of energy, transport and water supply and sanitation. Further data on the CDM as well as on investments in sustainable energy available from a number of sources allow assessment of private sector support for clean energy as well as progress made towards the deployment of environmentally sustainable technologies in developing countries.

Parties may want to discuss the need for a more comprehensive system for MRV of mitigation support and clarify the functions of such a system. Parties can also consider more specific system design issues,

including what data points to collect, how to collect the information, statistical or definitional issues, how to establish and maintain the database in a transparent and accessible manner, and where it should be housed. Establishing a harmonised, comprehensive tracking system under the UNFCCC, for example, could build on the existing OECD Creditor Reporting System, which provides much of the relevant detail on flows of bilateral mitigation support; this includes information on both the source of mitigation support and on the endpoints (by recipient countries, sector and project type).

The absence of verification procedures in the current UNFCCC monitoring and review system for mitigation support should also be addressed. The Convention does not lay out specific guidelines for the review of mitigation support reported in National Communications and reported information is not formally cross checked with alternative information sources. Parties could agree to the elaboration of guidelines for review and verification to help determine whether Parties have employed agreed methods for self assessment and reporting on technology transfer, capacity building and financing, and whether reporting is conducted in a transparent manner. In addition, standardised reporting by recipient countries about funds received, use and usefulness of funds could also be an important addition to provide information for verification with information on contributions to mitigation support. Moving towards a more comprehensive system of MRV for mitigation support should assist Parties to build trust and understanding by monitoring effective delivery of support commitments and to improve their own performance to achieve common climate change mitigation objectives as set out under the Convention.

1. Introduction

An important element of the Bali Action Plan is the introduction of the phrase “measurable, reportable and verifiable” (MRV) in the context of both “nationally appropriate mitigation actions” (NAMAs) and finance, technology and capacity building to support mitigation actions (herein referred to as “mitigation support”). Paragraph 1(b)(ii) of the Bali Action Plan calls for:

Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner.

There are several possible interpretations of this paragraph with regard to the nature and extent of the relationship between mitigation actions, mitigation support, and MRV. Agreement in the final hours of negotiation in Bali hinged on the scope of measures to which “measurable, reportable and verifiable” refers. An interpretation of the MRV requirement is that it does indeed apply to mitigation actions by both developed and developing countries, and to the provision of support in the form of technology, financing and capacity building (FCCC/AWGLCA/2008/11). An open question is that of who will provide resources for mitigation support to whom, as well as how to measure, report and verify (MRV) relevant support and mitigation action.

The UN Framework Convention on Climate Change (UNFCCC) provides the backdrop for the Bali Action Plan and the language laid out above should be understood within this context. The Convention makes clear that developed countries² are expected to support developing countries in their efforts to mitigate greenhouse gas (GHG) emissions. Specifically Articles 4.3 and 4.5 call for developed countries listed in Annex II of the Convention to provide “new and additional” financial resources to meet the “agreed full costs” of developing country implementation of Article 12.1 (reporting commitments) and the “full incremental costs” of developing country implementation of other measures under Article 4.1 (see Box 1). With respect to “full incremental costs,” the Convention makes specific reference to the financial mechanism of the Convention (Article 11). Developed country Parties also agree to support the development and enhancement of endogenous capacities and technologies in developing countries to assist them in the implementation of their mitigation commitments. Further, Article 4.7 recognises the dependence of effective implementation of developing country commitments on developed country support.

The Bali Action Plan is unclear regarding the degree of linkage between mitigation actions in developing countries and support for such actions. This issue will likely be decided in future negotiations, but in its current form paragraph 1(b)(ii) does not specify this relationship.³

Differences in interpretation of the intention of paragraph 1(b)(ii) of the Bali Action Plan, and indeed of the Convention language in these areas, should not preclude discussions about how to establish a framework for MRV to monitor progress in the area of mitigation support. This paper highlights existing knowledge and information about a range of different types of mitigation support and notes the implications for the structure of a future MRV framework.

² We use the term “developed countries” to refer to all developed Parties (i.e. countries and the CEC) listed in both Annex I and II of the Convention. Where we mean to refer exclusively to countries/Parties listed in Annex II we indicate this with a specific reference.

³ Other AIXG papers explore this question; see Kim et al 2009 as well as Kim et al 2009b.

1.1 Aim and scope of the paper

This paper aims to facilitate a discussion amongst Parties about a possible framework to measure, report and verify mitigation support. It considers the main pathways through which mitigation support to developing countries may flow as well as the availability and suitability of information in this area to provide a basis to measure, report and verify mitigation support.

Although the focus of this paper is on finance, the paper recognises that other types of support exist and are important to assist developing countries to plan and implement mitigation actions, e.g. in the form of technology support or capacity building efforts. Box 1 outlines a number of key definitional issues concerning the scope of the paper, including a definition of mitigation support. Different elements of a proposed MRV framework for mitigation support are further developed in the next section.

Box 1: Defining “mitigation support” and the scope of this paper

The definition of mitigation support used here is firstly focused on mitigation specific activities, namely: *financial resources, technology and capacity building activities that support developing countries to design and implement greenhouse gas mitigation action.*

What coverage of the geographic origins of mitigation support for developing countries? The paper explores a full range of options. However, consistent with the language of the Convention, a special focus is on support originating in developed countries to assist developing countries fulfil their mitigation responsibilities. It also highlights relevant flows of support between developing countries and within developing countries (even though much less information is available on these, they could become important over time) (Figure 1).

What type of support - only public or also private? Neither the Convention nor the Bali Action Plan specify whether the scope of mitigation support should be limited to public or private sector actions. Clearly both are important to mitigation and a key goal of public sector support is to stimulate private sector investment in climate-friendly technologies and practices. As public sector support is directly managed by governments and governments are Parties to the Convention, this paper aims to explore in some depth what is known about public sector mitigation support. The paper also provides some information on other relevant flows in the public and private sector (i.e. official development assistance and foreign direct investment in the energy sector in developing countries). Given that public and private flows of support intertwine, it is important to include both here.

How to define “new and additional”, “agreed full costs” and “agreed incremental costs” as referred to in Article 4.3 of the Convention? This paper recognises the importance of Convention language concerning the scope and expectations for financial mitigation support obligations of Annex II countries. However formal decision-making of the COP and/or the GEF have not clearly defined these terms. Until such definitions are available, there is no practical way to use them as criteria or benchmarks, against which to assess progress, are lacking. The paper therefore does not address this important issue.

The remainder of the paper is organised as follows: Section 2 briefly reviews the current monitoring system under the UNFCCC and proposes elements of a more comprehensive framework for understanding and tracking mitigation support across a variety of different sources and end-points. Section 3 tests this framework, focusing on financial support, to describe what we know today in terms of sources, types and end-points of finance for mitigation. It also considers key monitoring issues, in particular on the quality and availability of information in different areas. Section 4 concludes with an overview of how such a framework might evolve over time, also presenting suggestions for further work.

2. Towards a framework for MRV of mitigation support

There is already the start of a monitoring framework for mitigation support in place under the UNFCCC. This section reviews briefly by reviewing some of the main gaps in that framework and then moves on to lay out what an improved framework for MRV could include.

2.1 UNFCCC system as a basis for MRV of mitigation support

The UNFCCC National Communications currently serve as a main reporting mechanism for tracking progress in mitigation support. However, this framework has a number of strengths and weaknesses that should be addressed if it is to be used as the basis of a more comprehensive framework for MRV of mitigation support (see below). Despite some progress over time, many data gaps and inconsistencies persist in the UNFCCC monitoring system in this area, including:

- Inconsistent and/or incomplete self reporting of financial support;
- Infrequent reporting (every 4 to 5 years) as compared to monitoring and reporting systems outside the UNFCCC framework (annually or quarterly);
- Insufficient detail from National Communications (or other official sources) to indicate the amount of financial support directed to reporting or related capacity building versus support directed to mitigation actions;
- Limited and incomplete information on financing that currently falls outside of UNFCCC processes yet may be specifically targeting the mitigation of greenhouse gas emissions in developing countries e.g. via multilateral development banks or other dedicated channels of support;
- Lack of primary data on private or public financial flows under Kyoto Protocol mechanisms (most notably CDM); and
- Lack of verification procedures for reported information on mitigation support.

Data gaps and reporting frequency could be corrected through improvements in the national communications tool, e.g. through the reporting guidelines and the development of a common reporting format; this could include more detailed and frequent reporting on key mitigation support metrics. The UNFCCC could also collaborate to develop and formally use standardised data from non-Party sources and systems and work with relevant institutions to ensure this information publicly available.

Additional frameworks are also emerging in the UNFCCC process to monitor mitigation support in the areas of technology and capacity building. Although they are not reviewed here, efforts to develop technology transfer indicators could provide a solid basis for monitoring progress in this area. Furthermore, as the technology framework deals with the issue of enabling environments and public policy frameworks, it could serve as the basis for monitoring relevant intermediate outcomes in this area.

2.2 Elements of an improved framework for MRV of mitigation support

An improved framework for MRV of mitigation support could organise information along three main dimensions: 1) whether the finance is specifically tackling climate change (GHG mitigation) or whether it would occur regardless of climate change motives but is nevertheless relevant because it invests in

emission intensive sectors such as energy or transport infrastructure projects; 2) whether the type of support is public or private, or some form of public-private partnership; and 3) the geographic origin and directional flow of the support (e.g. whether it is North-South, South-South, domestic, or some combination of these).

In particular, along the first dimension, the framework categorises finance for mitigation into two main types of support:

- **“Mitigation specific support”** which aims to achieve greenhouse gas mitigation in developing countries as its main objective. This type of support may also target related reporting requirements (e.g. preparation and reporting of national greenhouse gas inventories or of National Communications including a description of national mitigation policies and measures). It may include public or private finance, technology support or capacity building pertaining to the Clean Development Mechanism under the Kyoto Protocol.
- **“Other mitigation relevant support”** includes financing for development more generally, however it refers to the key sectors that will also shape future greenhouse gas emissions as well as mitigation potential and costs of mitigation in developing countries. Relevant financial support includes, for example, potentially large portions of bilateral and multilateral official development assistance in energy and/or water infrastructure, waste management, agricultural or forestry sector development. It also includes collaborative research and development (R&D) initiatives that do not target climate change per se (e.g. in the energy and agricultural sectors). Finally, private sector flows, in the form of foreign direct and domestic investment, are helping to shape the pace and profile of future developing country emissions, and thus mitigation potential. These financing pathways may have either positive or negative effects on the levels of greenhouse gas emissions, mitigation potential and costs in any individual national context.⁴

The second dimension of the framework concerns whether the source of finance for mitigation is public or private or some combination of both:

- **Public** finance, where the source of mitigation finance is public treasuries and dispersal overseen by government functions;
- **Private** finance, where the source is generated through market allocation and triggered by policies that govern the functioning of markets in different areas (e.g. energy markets);
- **Public-private partnerships**, where public finance is combined with and leverages private finance (e.g. in the areas of water, transport or energy infrastructure).

Finally the third dimension pertains to geographic origin of mitigation support and distinguishes between four different options:

- **North-South** – where the finance originates in developed countries and flows to developing countries;
- **South-South** – where the finance originates in developing countries and flows from one to another;

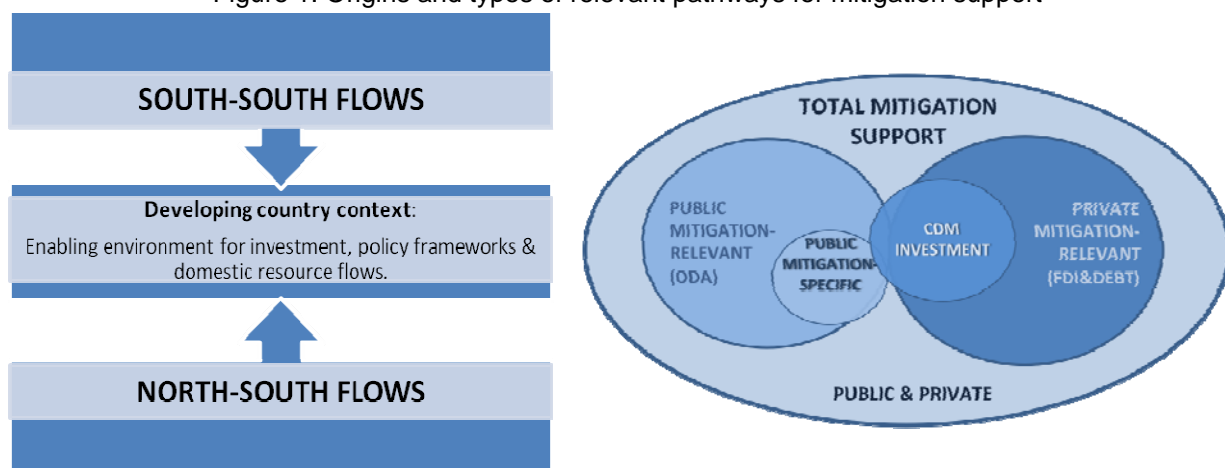
⁴ To avoid double counting, mitigation specific financing needs to be deducted from mitigation-relevant – hence the term “other mitigation relevant”.

- **Domestic** – where the finance originates from within the developing country where mitigation taking place; or
- some **combination** of these different origins

North-South and South-South finance can be seen as international sources of finance to support mitigation whereas domestic finance is from internal sources and is driven in large part by domestic policy frameworks that constrain or steer investment to climate-friendly outcomes. This occurs as part of the broader enabling environment for investment in a particular national context. In this case climate policies may explicitly put a price on carbon or otherwise regulate emission performance (thus placing a shadow price on carbon). In turn such a policy framework makes investment in low or no-carbon technology or infrastructure more profitable than it would be otherwise and improves the competitiveness of these investments relative to more conventional (higher emission) choices.

The paper recognises that a broad range of support in the areas of technology, finance and capacity building may be helpful, and in some cases instrumental to assist developing countries to plan and implement mitigation actions. However the focus here is on tracking financial support in part because we have data to monitor developments in this area.

Figure 1: Origins and types of relevant pathways for mitigation support



Source: Authors.

What needs to be measured, reported and verified will depend on the functions to be carried out with the information. For example, any MRV system might aim to inform investigation of the following key questions:

- What are the main sources and mechanisms for financing mitigation in developing countries?
- How much funding is currently available, in what form, from what sources or mechanism, and to whom, for what purpose and over what time frames?
- How significant is mitigation specific finance compared to other mitigation relevant finance?
- How important are public versus private sources of North-South mitigation finance? How do North-South sources compare to South-South or domestic finance sources?

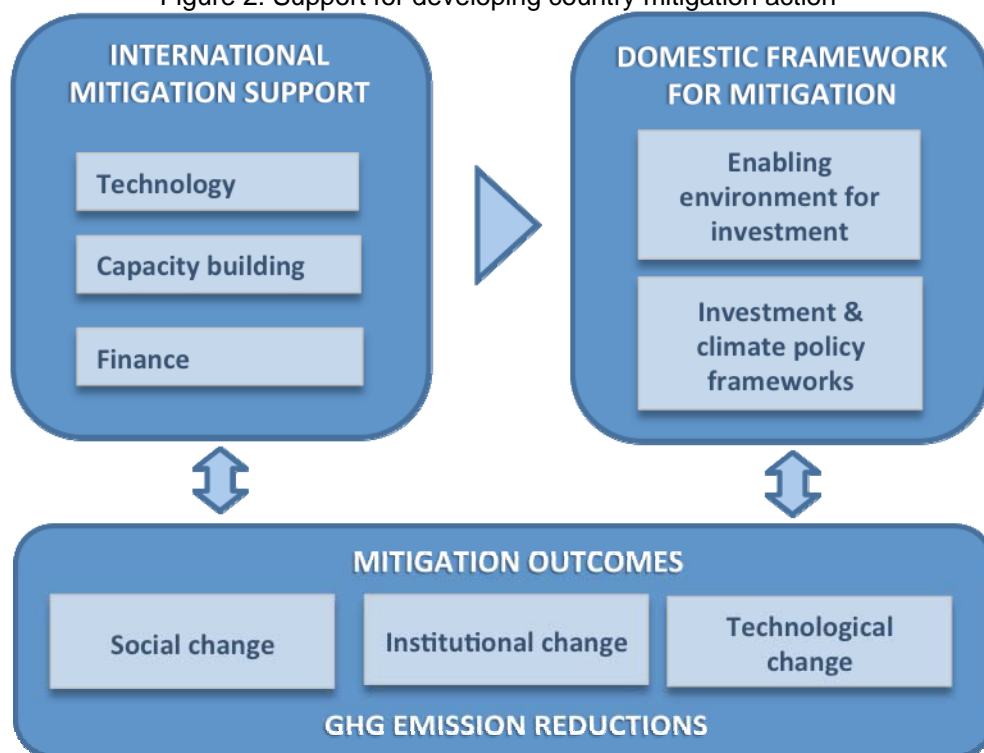
- Given that private finance is expected to far outweighs public finance sources, is it possible to comment on the “effectiveness” of public finance in terms of leveraging private investment?
- How effective is mitigation support? Are certain types of support more effective than others and if so why?

A framework for MRV of mitigation support will need to encompass a range of different kinds of information to address such questions. Elements of such a framework can be presented in terms of inputs to support mitigation action and outputs or mitigation outcomes (Figure 2). In addition, inputs may be measured and reported with the use of several different types of metrics, notably:

- Monetary (e.g. financial support for inventory preparation or R&D funding);
- Quantitative and measurable but non-monetary (e.g. the number of new energy technologies introduced through a support activity); or
- Qualitative (e.g. description of the nature of and the process through which there is delivery of in-kind support, advice or expertise).

Both quantitative (formally “measurable”) information as well as qualitative information will undoubtedly be necessary. Quantitative data will be more easily comparable across countries, if precisely defined and reported. However, including qualitative information can provide a more comprehensive understanding of mitigation support, especially in the areas of technology and capacity building.

Figure 2: Support for developing country mitigation action⁵



Source: Authors.

⁵ The figure is inspired by SBSTA work to develop measures for technology transfer, which suggests that it may be useful to cluster indicators for technology transfer into categories such as inputs, processes, outputs, outcomes and impacts (FCCC/SBSTA/2008/INF.2).

The language of the Convention (Box 1) implies that mitigation support may target two general purposes suggesting the need to track these separately:

- i) Support for preparation of national greenhouse gas inventories and National Communications or capacity building activities in either of these “monitoring” areas; or
- ii) Support for mitigation action itself e.g. to build a demonstration facility in the power sector, to design and implement mitigation policies in particular sectors, or related capacity building efforts.

Given the range of questions that an MRV system can be expected to inform, it would be useful for information on mitigation support to be collected such that it can be disaggregated by origin, type, recipient, general purpose and specific purpose (e.g. to mitigation sector end points). For example, amounts of funding provided from a contributing country in any one year, could be reported in sufficient detail to identify amounts by:

- Origin of support (i.e. the given country of origin)
- Type of support (i.e. if it is public funds, private investment or a combination of both);
- Recipient countries (i.e. developing country targeted by support activity);
- General purpose of support (i.e. for reporting, capacity building or directly to support mitigation action); or
- Sector endpoints (e.g. energy, land use, industry) and/or mitigation purpose.

3. Overview of Mitigation Support: What Financial Information is Available?

This section describes the levels and types of financing available from different sources to support mitigation in developing countries and key features of underlying information systems. The discussion is organised by type and source of financial support, starting first with public sources, moving onto private and finally public-private financial support. The discussion that follows necessarily skims the surface in any one of these areas. Focused on the financial dimension alone, it provides a broad overview of financial information and information systems available today.

3.1 Public support

There are several sources of information on public financial support for mitigation in developing countries. Some of these sources report the same information or activities (e.g. mitigation support as required under the Convention) but in different ways or for different audiences. In the public domain, these include bilateral assistance (as reported by donor countries both in the UNFCCC reporting system, in the dedicated financial mechanism of the UNFCCC – the Global Environment Facility -- and in the OECD Creditor Reporting System. Two last public sources of financing for developing countries that are relevant to mitigation efforts are also covered here: export credits; and public financing flowing through multilateral development bank channels, including a growing number of specific climate change funds.

3.1.1 Bilateral mitigation support as reported under UNFCCC

The UNFCCC monitoring system requires Annex II (developed country) Parties to periodically report information on bilateral financial support for mitigation in developing countries. Drawing on the most recent submissions (in the form of the Fourth National Communications), these countries reported annual flows of financial support of between USD 2 and 5 billion, for the period between 1999 and 2003.⁶ Though reporting is known to be only partial, the available data suggest that the industry, energy and transport sectors receive the largest share of total bilateral mitigation relevant assistance (50%, 12% and 29% respectively) and that mitigation far surpasses adaptation spending (the latter represents only 0.2% of total) (UNFCCC 2007b).

Monitoring issues

The UNFCCC reporting guidelines (UNFCCC 1999) require Annex II Parties in their National Communication to provide “details of measures taken to implement their commitments under Article 4, paragraphs 3, 4, 5 of the Convention.” This includes financial contributions to the Global Environment Facility (GEF) and multilateral institutions⁷ as well as bilateral contributions that target mitigation support (including capacity building). Parties may also report on “steps taken by governments to promote the transfer of environmentally sound technologies and to support the development and enhancement of endogenous capacities and technologies in developing countries.” The guidelines also suggest a common reporting format for this information requesting information on bilateral and regional programmes and financial contribution for mitigation and adaptation by subsector.⁸ The UNFCCC Secretariat regularly compiles this information in a synthesis report (UNFCCC 2007b).

There are however a number of data gaps and inconsistencies in reporting in the UNFCCC reporting system. These derive from many Parties not reporting information with the level of disaggregation and detail required; some Parties do not use the categories provided in the guidelines; Parties reported on financial contributions using different years; and information for financial support of technology and endogenous capacities of developing countries was provided by only some Parties. Furthermore, some Parties stated that figures presented in the Fourth National Communication (NC4) included financial contributions that may not be strictly climate change related. Other issues stem from the cross-cutting nature of capacity building which makes it difficult to agree on a common reporting format. Moreover there are no agreed quantitative metrics for policies and programmes enacted by Annex II parties to incentivise private sector participation in developing country mitigation. Information from the UNFCCC monitoring system in this area must therefore be interpreted with caution, as it is incomplete and in many cases is not standardised sufficiently to be comparable between countries. The National Communications are however a useful vehicle to convey qualitative information in these areas, e.g. for developed countries to routinely describe their programmes and strategies to provide mitigation support to developing countries to monitor (qualitatively) how these change over time.

⁶ This excludes contributions by the United States which are only reported for the year 2001

⁷ These include World Bank, International Finance Corporation, African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, United Nations Development Programme, United Nations Environment Programme, UNFCCC and other multilateral institutions. UNFCCC/CP/1999/7

⁸ Mitigation sub-sectors are energy, transport, forestry, agriculture, waste and industry. Adaptation sub-sectors are capacity building, coastal zone management and other vulnerability assessments.

3.1.2 *Global Environment Facility*

The Global Environmental Facility (GEF) is the operational entity of the financial mechanism of the Convention. It is accountable to the COP, which decides on policy orientation in the climate change focal area and provides guidance to the GEF on priorities and eligibility criteria for project funding. GEF funding depends on voluntary contributions from donor countries (i.e. largely Annex II countries but also Non-Annex II and Non-Annex I countries) which follow pre-defined burden sharing rules.

From 1991-2008, the GEF has allocated a total of just over 2.4 billion USD from its trust fund to the climate change focal area (GEF 2009). Funding of GEF climate change projects averaged about 163 million USD per year between 2003 and 2006, with this amount increasing by about 33% over the previous four year period.

The GEF also manages two special funds under the UNFCCC, the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF), as well the Adaptation Fund under the Kyoto Protocol (GEF 2008). As of August 2009, the total amount of disbursements from the SCCF was 59.8 million USD and the LDCF was 47.5 million USD (ODI 2009).

GEF financing is small compared to bilateral ODA for climate change as reported below. However, these values underestimate the role of the GEF given that the main objective of the GEF is to transform markets so that development can take a less carbon intensive path. GEF funding is estimated to leverage on average about seven times more investment capital through co-financing; the leveraging ratio varies from year to year with the ratios ranging from 3 to 11 over the last ten years (GEF database 2009).⁹

Monitoring issues

For each funded project, the GEF reports on information on recipient country, size of GEF grant, implementing agency, leveraged funds, and operational program (i.e. mitigation, adaptation measures and enabling activities) (GEF 2008). In order to increase predictability and transparency starting with the 4th replenishment period (GEF-4), the GEF has specified the amount each developing country can expect for the four years of GEF-4. GEF reporting thus provides a cross-check for self-reporting by Parties on contributions to the GEF and could also provide the same cross-check in the event that developing countries were to report on receipt of mitigation support.

The GEF collects and reports information on each Party's financial contribution to the Facility's trust fund as well as to the SCCF and LDCF. However the way that the GEF is managed does not allow identification of country-specific contributions for a single focal area such as climate change. This is because GEF contributions are for the full set of GEF focal areas (i.e. including not just climate change but also international waters, biodiversity among others). GEF Council, not individual countries, makes the decision on the specific allocations for various focal areas.

⁹ Where the leveraging ratio is equal to total investment (including private sector or other co-financing) divided by direct GEF public investment.

3.1.3 Bilateral ODA and the OECD “Rio Markers” for climate change support

Bilateral official development assistance (ODA) is concessional finance monitored by the OECD Development Assistance Committee’s Creditor Reporting System (DAC-CRS).¹⁰ In the OECD system, ODA is defined as financial support that has as its main objective to promote the economic development and welfare of developing countries; it must be concessional and convey a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent).¹¹ Bilateral ODA in the period 2003-2007 averaged about 104.7 billion USD per year. This marks a net upward trend from the 2000-2002 period with an increase of about 52% in real terms.

Beyond time-series data for each DAC Member country and the EC, the statistical system provides a high level of sectoral detail, which can be used to estimate mitigation relevant bilateral ODA. Further, it is possible to estimate mitigation specific bilateral assistance for the last ten years through what is known as the “Rio Marker” series (see below).

Bilateral ODA¹² commitments in mitigation relevant sectors are estimated to represent about 24% of total bilateral commitments, the largest shares being in the areas of transport and storage (5%), power production and other energy (4%) (see Figure 3). ODA flows to mitigation relevant sectors averaged 25 billion USD between 2003 and 2007, up 27% from the 2000-2002 period.¹³

The Rio Marker data for 2003-2007 show that on average, climate change mitigation specific ODA from the DAC’s 23 members amounted to about 3.5 USD billion annually. This amount represents about a 65% increase from the average over the 2000-2002 period, however it is less than 4% of mitigation relevant flows over 2003-07. Table 1 presents an overview of the recent levels of mitigation specific bilateral ODA against the backdrop of total bilateral ODA.

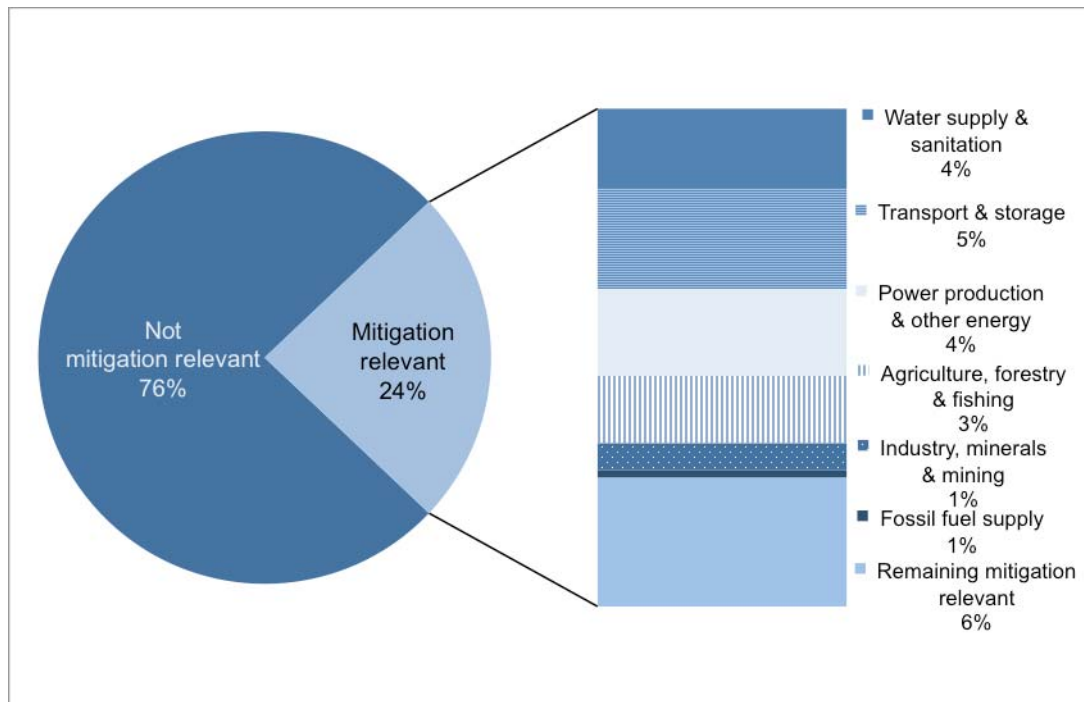
¹⁰ The DAC is made up of 23 members (22 countries and the EC). It is the key forum in which bilateral donors work together to co-ordinate development co-operation and to increase the effectiveness of their efforts to support sustainable development.

¹¹ For more information see: OECD Factsheet, “Is it ODA?” November 2008, <http://www.oecd.org/dataoecd/21/21/34086975.pdf> [last accessed 3 September 2009].

¹² This is defined as the aggregate going to support the following sectors: agriculture and forestry, fishing, mining, mineral resources and mining, industry, energy, water supply and sanitation, transport and storage, and construction.

¹³ These data are reported in constant 2007 USD.

Figure 3: Bilateral ODA Commitments - by Sector (2003-2007): 104.7 Billion USD/year (average)



Source: OECD DAC-CRS database 2009.

Monitoring issues

The OECD Development Assistance Committee (DAC) Creditor Reporting System (CRS) gathers harmonised data annually for most types of financial flows coming from its Member countries and from a number of multilateral agencies (the latter reporting on a voluntary basis).¹⁴ The OECD CRS database records aid data at the activity level and allows disaggregation of statistics on aid by sector through 197 different purpose codes. Purpose codes can be aggregated into a variety of end sectors. Mitigation relevant ODA (e.g. energy, water supply and sanitation, transport, industry, extractive industries, construction, agriculture and forestry) can therefore be distinguished from non-mitigation relevant (e.g. ODA for health research, or emergency food aid).

Furthermore, within mitigation relevant sectors, the level of detail allows identification of activities likely to contribute to mitigation support. For example, within the energy sector, fossil fuel (gas, oil, coal), renewable and nuclear energy facilities are all separately identifiable. However, distinguishing between funds that exacerbate or enhance GHG reduction is not feasible in many instances (e.g. it is not possible to distinguish between dirty and clean coal). Activities targeting the objectives of the UNFCCC are identified using the “Rio Markers”, which screen for policy objectives that have a cross-sectoral nature including climate change, biodiversity, and desertification. Each CRS aid activity gets a mark for these policy objectives: 0 for “not targeted”, 1 for “significant objective” and 2 for “principal objective”¹⁵. Based on

¹⁴ Reporting multilateral funding agencies include: AfDB, AfDF, AsDB, AsDF, EC, IBRD, IDA, IDB, IDB Sp.Fund, IFAD, UNDP, UNICEF, UNAIDS, UNFPA, GFATM

¹⁵ In the terminology of this paper, projects marked 1 and 2 by Rio markers are mitigation specific, while the projects marked 0 can be mitigation relevant, depending on their sector.

descriptive information on the activities, it is possible to distinguish between different purposes of investment (e.g. investment in infrastructure versus capacity building).

Table 1: Bilateral climate change related ODA, reported in CRS from 2003-2007 (constant 2007\$, million USD)

	Total Bilateral ODA Average 2003-07		Rio Climate Change Related Average 2003-07	Rio Climate Change % of Bilateral ODA Average 2003-07
	constant 2007\$	as % of GNI 2007		
Australia	1846.2	0.32%	24.2	1.3%
Austria	970.4	0.50%	12.6	1.3%
Belgium	1745.0	0.43%	18.9	1.1%
Canada	2907.8	0.29%	44.5	1.5%
Denmark	1524.2	0.81%	150.3	9.9%
Finland	620.5	0.39%	8.3	1.3%
France	8910.3	0.38%	222.5	2.5%
Germany	8833.6	0.37%	728.3	8.2%
Greece	245.5	0.16%	3.6	1.5%
Ireland	600.9	0.55%	6.2	1.0%
Italy	2045.8	0.19%	7.8	0.4%
Japan	12970.6	0.17%	1726.2	13.3%
Luxembourg	221.7	0.91%	0.0	0.0%
Netherlands	5321.1	0.81%	177.1	3.3%
New Zealand	267.4	0.27%	5.9	2.2%
Norway	2445.8	0.95%	17.4	0.7%
Portugal	523.7	0.22%	10.3	2.0%
Spain	2595.3	0.37%	33.1	1.3%
Sweden	2760.1	0.93%	10.8	0.4%
Switzerland	1357.5	0.37%	14.9	1.1%
United Kingdom	8071.9	0.36%	23.8	0.3%
United States	25678.4	0.16%	31.1	0.1%
EC	12317.1	n/a	265.6	2.2%
Total	104781.0	0.28%	3543.7	3.4%

Source: OECD - DAC-CRS database, last accessed 8 July 2009.

Since CRS reporting is based on agreed definitions and classifications, it permits comparisons between contributing countries. However, as Rio Markers apply to the project as a whole, they do not allow exact quantification of aid activities' contributions to the objectives, and thus, figures based on Rio Markers are approximate. Despite the high level of standardisation and relevant detail, the Rio Markers data series is currently incomplete as some countries have not systematically used the marker system.¹⁶ This will improve in the future as the DAC agreed in June 2008 to institutionalise the Rio Markers making them a mandatory part of reporting requirements for DAC members. Unfortunately, similar information is not available for multilateral development banks or other multilateral development institutions, which do not

¹⁶ It is interesting to note that in a review of environmental aid trends, researchers Roberts et al. lament the OECD CRS system as having "serious problems." This may or may not be true today as the system is continually updated and improved. Despite some data inconsistencies and gaps, it has the major advantage of being an increasingly stable and comprehensive statistical system (thus aiming to achieve consistent data sets over time) and being publicly accessible thus subject to scrutiny and external review.

report to the CRS using Rio Markers.¹⁷ The OECD system currently does not include ODA from non-Member countries (i.e. China) however discussions are on-going to extend the system in this direction.

It is important to note that for a number of important donors, there is a move away from project based towards programmatic financing. This means that more funds are being allocated to budget support and contributions to support national development plans rather than targeted to project based investments having specific sector endpoints. In these cases, tracking the sector of destination is difficult.

Also, although the Rio Marker system for climate change was developed in collaboration with the UNFCCC secretariat and with the objective of facilitating donors' reporting to the UNFCCC, only a few Annex II parties have used Rio Markers in their NC4 (Austria, Belgium, Japan and Netherlands). The OECD makes the marker data freely available to all on the internet and in this way it can be seen as a supplemental data source for UNFCCC monitoring of financing flows for mitigation.¹⁸ As there are standardised definitions, the OECD Rio Marker data represent a more systematic treatment of the same bilateral delivery channels for mitigation support than what is reported by countries in the UNFCCC monitoring system. Even though there is no such formal requirement to do so, the OECD DAC information is used during the UNFCCC "in-depth reviews" of National Communications to cross check information reported by countries.

3.1.4 Export Credits

Export credit agencies (ECAs) typically provide funds (direct loans) or guarantees to facilitate exports in riskier overseas markets. Net export credits provided officially by or on behalf of OECD governments to developing countries are reported by contributing countries through the OECD, where rules to ensure a level playing field are negotiated and monitored (OECD 2009). Long-term export credits, i.e. with a repayment term of 5 years or more, are reported with detail about sector allocations and are thus the focus of the analysis here. Long-term export credits to developing countries are provisionally estimated at 31.23 billion USD on average annually between 2002 and 2008, of which it is estimated that 16.9 billion USD is flowing annually on average to mitigation relevant sectors (Figure 4).¹⁹ For the period 2002-2008, nearly all long term official export credits flows are estimated to go to mitigation relevant sectors with the transport and industry sectors, followed by energy, accounting for nearly 90% of official export credits.

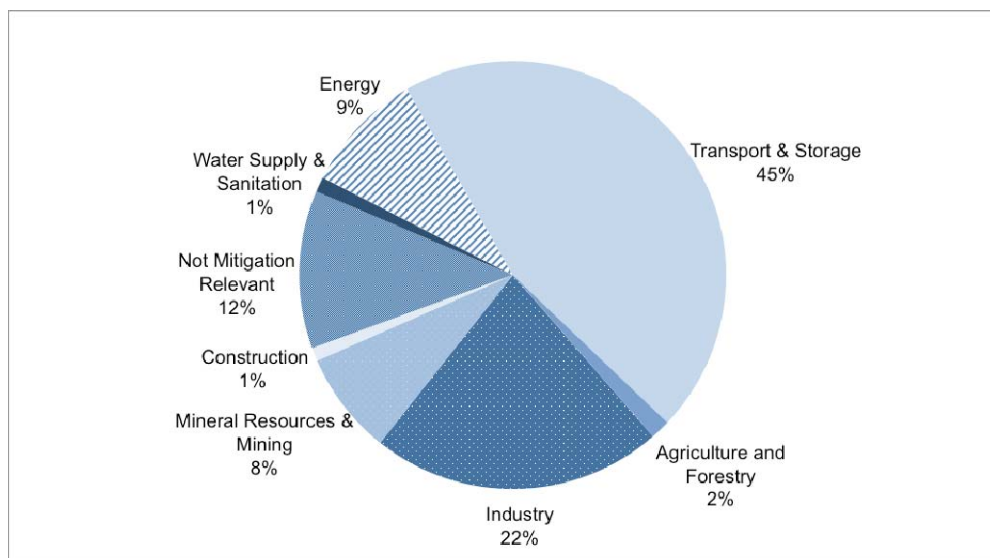
A look at the longer term period between 2002 and 2008 shows an important share going to the energy sector (about 9%, or 2.9 billion USD annually on average). However mitigation specific export credits (i.e. those going to "low-carbon energy technologies" including nuclear, hydro, geothermal, solar, wind, tidal and biomass) amounted to only a small share of this with just over 534 million USD on average per year, or about one-sixth of total export credits in the energy sector, between 2002 and 2008.

¹⁷ An important exception is for projects executed by multilateral institutions or non-governmental organisations on behalf of DAC members are classified under bilateral aid (since it is the donor country that effectively controls the use of the funds) and therefore reported (OECD 2008).

¹⁸ Although adaptation financing is not covered in this paper it is important to note that the Rio Marker system is currently be developed to also cover adaptation.

¹⁹ These figures are updated by OECD staff from the OECD database (described in OECD 2007c) on the basis of more recent provisional data from OECD countries.

Figure 4: Official Long Term Export Credits by Sector (2002-2008): 31.2 billion USD/year (average)



Source: OECD statistics on export credits, 2009.

Export credit agencies are encouraged, under an OECD Recommendation, to assess the environmental impacts of projects that they finance. While this does not guarantee that funds will go to “green” projects, it aims to diminish interest to invest in “dirty” projects, including high emission ones. The benchmarks for project assessment are provided by World Bank and IFC standards, and these also include GHG emission related criteria.²⁰

Monitoring issues

Official statistics from OECD currently provide information on ECA support, including commitments by donor, recipient country, and, for credits with more than 5 years repayment term, by end sector with the same level of disaggregation as with ODA; however the purpose codes have been slightly modified from those used by DAC. As with bilateral ODA in the DAC system, this makes it possible to distinguish mitigation relevant export credits but harder to distinguish between export credits that enhance or counteract GHG reduction.

Access to the OECD Export Credits database is restricted, in principle available to governments only.²¹ Also, available data on export credits from OECD Export Credits Division are currently subject to a long-term data audit and consequently do not have sector detail on the allocation of export credits to each developing country. As a result it is not possible to determine with precision the share of total export credits that is going to mitigation relevant sectors in individual developing countries or to developing countries in the aggregate. However long term official export credits going to developing countries are estimated to represent the majority of the total; we can therefore assume that the share of sectors relevant to mitigation is consistent with the pattern outlined above. Also, officially supported export credits as

²⁰ More information on this can be found at www.oecd.org/document/4/0,3343,en_2649_34181_38752004_1_1_1_1,00.html

²¹ For more information about the OECD arrangement with countries and the reporting system for official export credits, see OECD 2009, and also the OECD website: www.oecd.org/trade/xcred [last accessed 13 September 2009].

defined and tracked in the OECD system, do not represent the totality of export credits with some share of such credits falling outside of this arrangement (OECD 2009).

3.1.5 Multilateral development banks and specific climate change funds

Multilateral development banks (MDBs) are public financial institutions whose missions are to alleviate poverty by financing projects and policy in developing countries. MDBs channel large sums of money for development purposes through a variety of financial instruments (concessional loans, grants, guarantees, etc.).

Much of MDB finance flows to mitigation relevant sectors that will be key to reducing greenhouse gas (GHG) emissions. For example, between 2003 and 2007, MDBs are estimated to have invested 44.7 billion USD on average annually in developing countries and economies in transition, of which just under half of the investments were in sectors relevant to climate change mitigation (about 22 billion USD per year on average). As such, it can be argued that MDBs have a central role to play in supporting low-carbon development in recipient countries.

An important question is how climate change mitigation is taken into account in the MDB mitigation relevant investment portfolio. The European Bank for Reconstruction and Development (EBRD) is the only MDB with an explicit mandate to promote energy efficiency. The EBRD screens all projects for potential energy efficiency components as part of the regular appraisal process, and rates projects based on their potential for saving energy.

Mitigation specific investments by MDBs are estimated by the World Bank to have seen a significant rise in recent years. On average commitments to clean energy and energy efficiency alone in developing countries reached 4.1 billion USD annually for the years 2006-2007, up 85% from an annual average of 2.2 billion USD between 2000 and 2005 (excluding the Clean Investment Fund – see below) (WB 2006).²² For the year 2008, the World Bank group alone is estimated to have committed 2.7 billion USD to energy efficiency and renewable energy of which 1.2 billion USD was for energy efficiency.²³

A significant part of MDB mitigation specific capital is invested in the Kyoto market mechanisms, i.e. to purchase certified emission reductions (CERs) or emission reduction units (ERUs). The World Bank Group has 2.1 billion USD under management in 10 carbon funds and facilities.²⁴ About 1.6 billion USD has been committed, with the remainder expected to be committed over the next two years (World Bank 2008a). Most of the existing funds are designed to be phased out after the delivery of emission reduction assets to participants.

Over the summer of 2008, MDBs created the Climate Investment Trust Funds (CIF) to which donor countries have already pledged 6.1 billion USD. The CIF comprises two new trust funds, one for scaling up investments in low-carbon technologies (Clean Technology Fund - CTF) and the second to support

²² Note these sums are taken from a World Bank report (WB 2006), as there is no common data base to permit original analysis of this type. It comprises the public finance component only, excluding private sector funding and also excluding European Investment Bank financing in order to estimate flows to developing countries.

²³ Personal communication, 2009, from the World Bank (P. Ambrosi and Sameer Akbar).

²⁴ Prototype Carbon Fund, Biocarbon Fund (91 million USD), Community Development Carbon Fund (128.6 million USD), Forest Carbon Partnership Facility (300 million USD), the Netherlands Clean Development Facility, the Italian Carbon Fund (155.6 million USD), Danish Carbon Fund (68.5 million USD), Spanish Carbon Fund (USD 278.6 million), Carbon Fund for Europe, Umbrella Carbon Facility (719 million USD - IBRD managed) and Carbon Partnership Facility.

various programs to test innovative approaches to climate change (Strategic Climate Change fund - SCF). Currently investment plans from Turkey, Mexico and Egypt are under review for decision in the CTF however actual disbursements have not yet occurred. Donor contributions to the Climate Investment Trust Funds are intended to be new and additional to existing ODA funding levels.²⁵ Given the size of the funds, these could be significant new sources of mitigation specific financing for developing countries.

A number of other specific funds managed by the World Bank may be particularly relevant to capacity building. These include the Community Development Carbon Fund (CDCF), the BioCarbon Fund (BioCF) and the Forest Carbon Partnership Facility (FCPF), which represent around 520 million USD. This is because they operate in difficult niche markets that the private sector would otherwise largely bypass (World Bank 2008b). Some MDB funds also go directly to capacity building (e.g. the 100 million USD Reducing Emissions from Deforestation and Degradation (REDD) “Readiness Mechanism” of the Forest Carbon Partnership Facility - FCPF).

Monitoring issues

Although MDBs have publicly available databases that provide information on funded projects (including project description, goals, and amount and timing of investment), data are only available at the aggregate level, which prevents identification of end-points for mitigation (or adaptation)-specific funding. Also, data are not gathered into a single coherent database nor are they verified and harmonised into standard comparable formats. Information on mitigation specific (or relevant) activity in MDBs is also not captured through reporting by MDBs to other institutions, for example such information is largely absent from the OECD DAC-Creditor Reporting System²⁶ or UNFCCC. Annex II Parties report some MDB contributions in their UNFCCC National Communications.²⁷ As a result it is impossible to exploit available data in such a way as to have an overview of the flows over time to mitigation relevant activities by recipient country and/or end-point.

3.2 Private and public-private financial support

3.2.1 Clean Development Mechanism

The Clean Development Mechanism (CDM) may be considered a source of public-private mitigation support. Although public financing has been instrumental to build capacity and in some cases to directly invest in projects, the CDM is increasingly directing large amounts of private capital into climate change mitigation projects in developing countries. While there are a few efforts to assess annual investment flows into the CDM, standard methodologies to do so are lacking. This paper draws on recent analysis commissioned by the UNFCCC secretariat to present estimates of the investment flows associated with CDM projects (Seres and Haites 2008; UNFCCC 2007a).

²⁵ Further information on the CIF governance structure and future operations can be found at <http://go.worldbank.org/58OVAGT860>

²⁶ As mentioned reporting to the OECD DAC is not mandatory but only takes place on a voluntary basis as MDBs and UN bodies are observers and not members of the DAC.

²⁷ Annex II countries report on total contributions to the World Bank, International Finance Corporation, African Development Bank, Asian Development Bank European Bank for Reconstruction and Development, Inter-American Development Bank, United Nations Development Programme, United Nations Environment Programme and UNFCCC.

Figure 5 shows estimates of the amounts to be invested in CDM projects "entering the pipeline"²⁸ or registered in a given year (Seres and Haites 2008).²⁹ These investment estimates are constructed on the basis of project documents and reported values of anticipated investment by project type. The estimates show CDM investment rising exponentially in this period along with the numbers of CDM projects. The amount expected to be invested in projects registered during 2007 (about 11.5 billion USD) is significantly lower than the amount for projects entering the pipeline during the same year (about 45 billion USD) revealing the lag of nearly one year between when projects enter the pipeline and are finally registered. It is important to note that the investment may not have actually occurred during the year a project is registered, as there is also a lag between project registration and its implementation.³⁰

Investments in CDM projects are not necessarily a North-South flow: roughly 50 percent of all CDM capital is invested in unilateral projects for which project proponents in the host country bear all the costs before selling the CERs (UNFCCC 2007a).³¹

It should be noted that the overall size of the CDM market is not a good indicator of the investment in CDM projects or the North-South financial flow generated by CDM projects. This is because once Certified Emission Reductions (CERs) generated by CDM have been sold, they can be subsequently transacted on the secondary market but these transactions do not represent a new investment in a CDM project. A recent estimate of the size of the CDM market puts the value of transactions at almost 33 billion USD in 2008 (World Bank 2009). However about 80 per cent of the total value represents secondary trading of CERs; only the primary sales of 6.5 billion USD could be considered to represent a North-South financial flow.³² This is lower than the estimated investment, indicating that it will take several years to recover the investment. Another way to look at this financial flow associated with primary sales of CERs is as return on investment.

²⁸ CDM projects are considered to be in the CDM pipeline once public comments have been solicited by the "designated operational entity", as part of their validation process (Seres and Haites 2008).

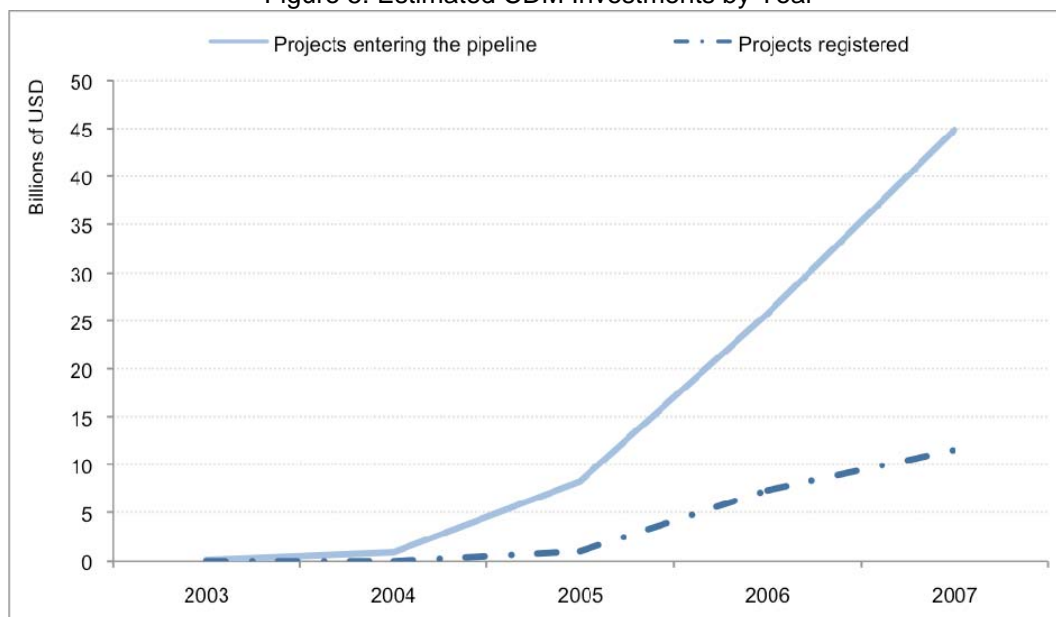
²⁹ These estimates are made using the capital cost (per thousand tons of CO₂e) of annual estimated emission reduction for project types using data from 3296 projects (Seres and Haites 2008). The estimated investment required varies widely by project type from \$10 per ktCO₂e for PFCs to \$5,349 per ktCO₂e for solar, and averages \$325 per ktCO₂e across all project types.

³⁰ The existence of this lag suggests a third possible metrics for CDM projects as the amounts effectively invested. Although this lagged series is not shown in Fig 5, it could technically be estimated and tracked.

³¹ The ratio of unilateral projects may vary significantly between host countries. India is home to the most unilateral projects (33 percent of projected annual emission reductions in the pipeline at the end of 2006), followed by China (20 percent), Brazil (11 percent) and Mexico (6 percent) (UNFCCC 2007a)

³² These estimates are made using the capital cost (per thousand tons of CO₂e) of annual estimated emission reduction for project types using data from 250 projects and from the World Bank.

Figure 5: Estimated CDM Investments by Year



Source: Seres and Haites 2008 – revised estimates based on personal communication with authors.

Box 2: Estimating CDM investment – what portion can be attributed to the CDM?

The estimated investment for CDM projects may not be solely attributable to the CDM. For instance, wind farm and hydro projects are implemented to increase the host country's power generation capacity. In the absence of the CDM, it is likely that investment to increase the country's power generation capacity would have occurred, albeit with a different technology and lower capital outlay. But for project types where there is no revenue stream other than CDM credits, such as landfill gas and CO₂ capture, it is fair to assume that the capital cost expenditures are solely attributable to the CDM.

Source: extract from Seres and Haites 2008.

Finally, it is also possible to review trends in the sources of capital available for investment in multilateral public and private carbon funds targeting the CDM. Analysis shows that while development banks and government agencies were dominant in initial stages of CDM fund development, in the past years the dominant source of capital has been private investment funds.³³ These funds have strategies that include investing in proposed projects, commitments to purchase CERs, purchase of primary CERs, and secondary trading in CERs. Some of the funds aim to obtain CERs for distribution to their investors while others seek a financial return.

Monitoring issues

Financial flows under the CDM are not systematically monitored or reported anywhere in a centralised manner, and as noted above, there are no standardised methods for estimating investment from available data. This review illustrates two (and possibly three) different ways to monitor international investment flows stemming from the CDM projects. To track investment flows stemming from the CDM

³³ Personal communication, Ian Cochran, Mission Climat, Caisse des Dépôts, France.

systematically, the COP would need to decide on accounting rules and assign to the FCCC Secretariat to generate and report estimates on an annual basis.

In particular, investment in the CDM can be estimated based on project capital costs as reported in Project Design Documents (PDDs). However, technically this is possible only in cases where projects use financial analysis to demonstrate additionality, not in cases where barrier analysis data is used. Currently, available investment data is not systematically gathered and aggregated.

Even in cases where we can accurately monitor investments, it remains difficult to determine which proportion of the CDM investment is incremental (i.e. what part of the total investment in the project is stimulated by carbon finance sources) (see Box 2).

As noted above, another way to look at the CDM is by the value of the CERs that are generated by the corresponding CDM projects. The total monetary value of primary transactions in CERs can only be estimated using market prices of CERs and volume of CERs generated in any one year. UNEP-Risoe regularly gathers information on CDM projects and the total volume of CERs produced in any one year (UNEP-Risoe 2008). Although such a serialized and systematized data provides valuable complementary metrics, this indicator essentially measures the returns on CDM investments. Estimates of the value of CERs are thus not homogenous with the other metrics discussed in this paper, which deal with amounts invested.

3.2.2 Foreign Direct Investment

Foreign direct investments (FDI) represent the largest source of private, mitigation relevant, financial flows from developed to developing countries. FDI is defined as an investment made by a resident entity in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) resident in another economy. For statistical purposes, the lasting interest is demonstrated by ownership of at least 10% of the voting power in an enterprise.³⁴

Global FDI inflows are estimated to have reached 1.4 trillion USD in 2008 and inflows to developing countries reached 517 billion USD for that same year (UNCTAD 2009).³⁵ Sectoral data is only available periodically from UNCTAD thus making it difficult to extract trends with respect to investment in mitigation relevant areas. Using the two different periods available in the last decade, it is possible to identify significantly different shares of FDI in mitigation relevant sectors in developing countries: from 1989-1991 investment in these sectors is estimated to comprise 65% of the total whereas from 2003 – 2005 it is estimated to be only 45% (UNCTAD 2007).³⁶

Figure 6 provides an overview of the sector shares of mitigation relevant FDI (as defined in section 2.2) within the total (259 billion USD average per year) for the period 2003-2005. It shows that of the 45%

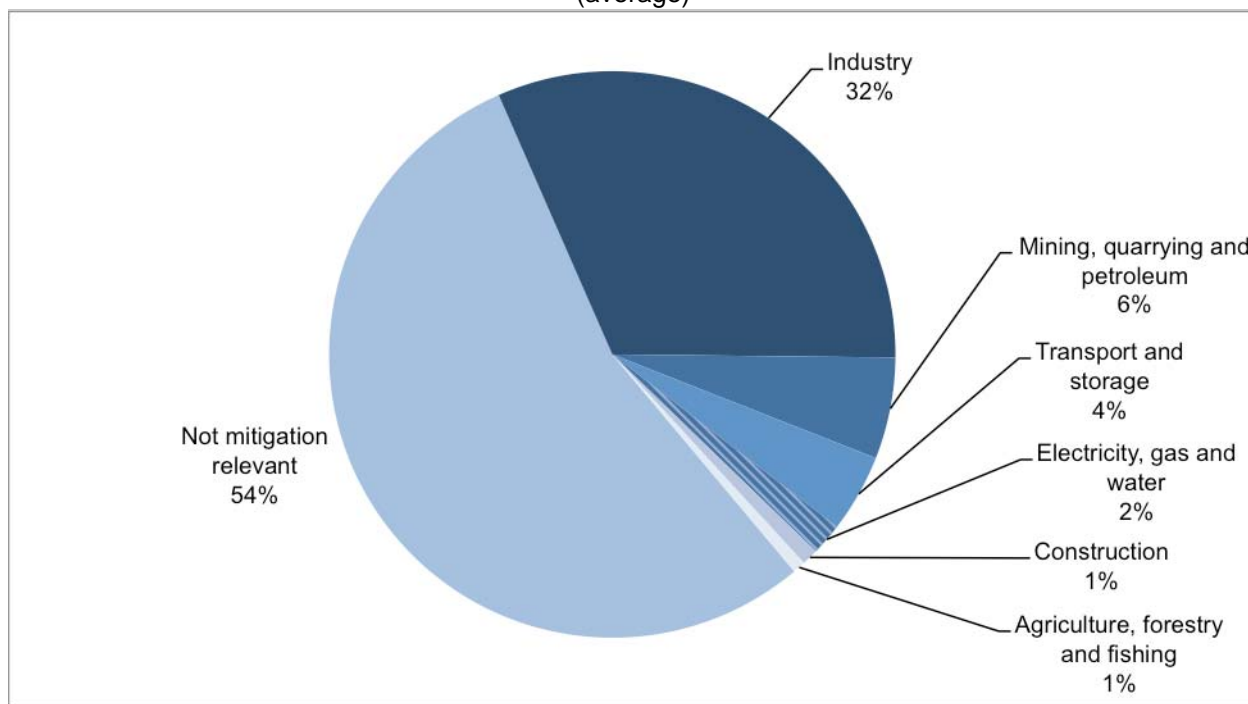
³⁴ A direct investment enterprise is defined as an incorporated or unincorporated enterprise in which the direct investor, resident in another economy, owns 10 percent or more of the ordinary shares of voting power (or the equivalent). Therefore, FDI relationship is based on “influence” over associates, and not necessarily “control” of subsidiaries (for which the threshold is 50% of ownership). However, the 10% criterion is not strictly observed by all countries reporting. For more detailed information, please refer to the UNCTAD World Investment Report 2008, and OECD Detailed Benchmark Definition of FDI.

³⁵ UNCTAD press release available at <http://www.unctad.org/Templates/webflyer.asp?docid=10930&intItemID=1528&lang=1>

³⁶ In the same time frame, the country grouping known as economies in transition (EIT) were broken out from the developing country grouping, changing the statistical definition of “developing countries” in this data series.

estimated to be mitigation relevant (about 118 billion USD on average per year), the largest share is in the industry sector (32% of the total), followed by mining & quarrying (6%) and transport & storage (4%).

Figure 6: Foreign direct investment by sector to developing countries (2003-2005): 259 billion USD/year (average)



Source: UNCTAD 2007.

Monitoring issues

UNCTAD publishes the World Investment Report yearly, which analyses global FDI trends, and also maintains a database on FDI and transnational corporations. The database includes 1.1 million pieces of data on FDI flows and stocks with detailed geographic and industry breakdown, and 1.9 million pieces of data on activities of transnational corporations (parent firms and foreign affiliates). Data on FDI is reported by both the investing country and the country in which the investment is made, which allows a partial assessment of the reliability of this data. There are important gaps in the data reported by UNCTAD; in particular, sector data are only available for certain years and in certain countries.

As is the case with ODA, it is difficult to distinguish between mitigation-relevant investments that mitigate or lower GHG emissions from a previous level or those that may have the opposite effect within the same sector. Furthermore there are a number of limitations to the use of FDI data as not all investments result in new production. In particular, funds moved from parent firms to their foreign affiliates do not represent the actual use of funds; most mergers and acquisitions do not add new production; net data may hide real investment trends; and the increasing role of offshore financial centres blurs the final destinations of investment.

3.2.3 Other private

3.2.3.1 South-South FDI

Developing country investors have also emerged as a major source of investment finance in many mitigation relevant sectors (OECD 2006; Schur et al 2008). For example, during 1998–2006 these investors accounted for more finance for infrastructure projects with private participation in South Asia and East Asia and Pacific and for more in transport across developing regions than did investors from developed countries (Schur et al 2008; World Bank 2009a). This South-South dimension has major implications that should not be overlooked when considering private financial and investment flows to mitigation relevant sectors. Issues include competition across sources of financing and an even greater need for sound and conducive domestic institutional, regulatory and policy frameworks to guide private investment in ways that are compatible with national development priorities and ideally, low-carbon versus high carbon growth.

3.2.3.2 International private loans

International debt is often used to finance investment, and is estimated to represent almost 20 percent of global private and public investments annually (UNFCCC 2007). It is not possible to determine if international debt is invested in new, physical infrastructure (it could be used for operating purposes) nor whether it is invested in activities that mitigate emissions (UNFCCC 2007; BIS 2007). As such it is currently not possible to determine which portion of foreign debt is mitigation relevant.

Monitoring issues

The Bank for International Settlements (BIS) provides information on international debt which includes loans provided by commercial banks and the sale of bonds in the capital market. As BIS covers only debt issued by banks in 40 large lending countries, total foreign borrowing is incomplete and underestimated by this source. Data on new international debt borrowed or issued by countries and corporations are available for each year and data can be divided between the public sector and private financial institutions (BIS 2007).

3.2.4 Domestic and other public-private investment

While there may be large financial and investment flows moving from developed to developing countries, much larger investments are also estimated to be flowing through domestic channels. The UNFCCC (2007) estimated that in the year 2000, domestic sources of investment represented 83 percent of total investment in non-Annex I countries, while FDI represented only roughly 14 percent of the total foreign debt and ODA represented 2% and 1%, respectively.

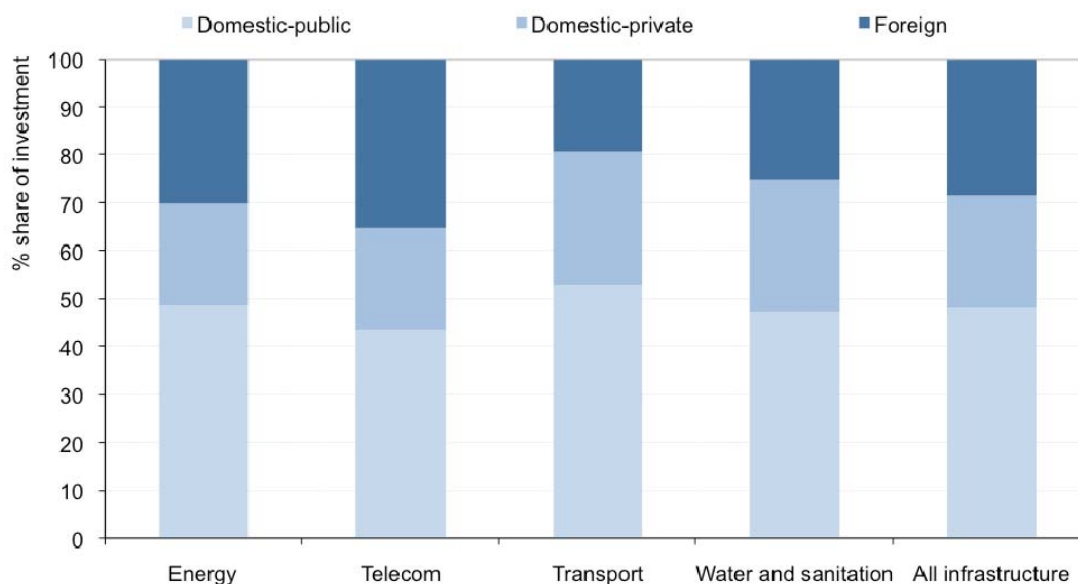
3.2.4.1 The case of infrastructure

In the area of infrastructure, there is evidence of a significant coupling of private and public investment, and in the case of developing countries, domestic and foreign sources of capital. Private investment in energy, water and transport infrastructure totalled 82.3 billion USD in 2007 (World Bank 2009). Public investment would appear to be roughly equal to this. Infrastructure investments are important as they last for decades and could be significant to steer development towards low-carbon futures.

Foreign (FDI and public ODA) investment and domestic private finance couple with domestic public sources of investment in the areas of energy, water and transport infrastructure (UNCTAD 2007 and 2008; see Figure 7). Analysis of World Bank data on infrastructure investment shows that over the last decade

foreign investment represents the smallest share of total infrastructure investment in developing and transition countries, with the largest shares coming from domestic public and private sources (UNCTAD 2007).

Figure 7: Share of domestic private and public investment and foreign investment in infrastructure in developing and transition economies, by type of infrastructure (1996-2006)



Source: UNCTAD secretariat calculations, based on data from the World Bank's PPI Database; UNCTAD 2007.

Note: Data cover all developing economies, except high-income developing economies such as Hong Kong (China), the Republic of Korea, Singapore, Taiwan Province of China; and all the transition economies (i.e. South-East Europe and CIS), except Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia, which are members of the EU and are classified as developed countries by the United Nations.

Rapid economic and population growth accompanied by urbanisation has created very large investment needs in infrastructure in developing countries (UNCTAD 2008). The need in this area appears to far exceed investment amounts currently planned by governments and the private sector combined, thus creating a significant investment gap in this area (UNCTAD 2008; World Bank 2008c). For example, the World Bank has estimated that, on average, developing countries actually invest about 3–4% of their GDP on infrastructure annually, whereas that they should be spending about 7–9% on new investment projects and maintenance of existing infrastructure, if broader economic growth and poverty reduction goals are to be achieved (World Bank 2008c). Focusing specifically on infrastructure investment in developing countries, public (domestic) funding accounts for about 70% of the total, private financing represents a further 20% and ODA makes up the remainder. In order to meet the shortfall, governments will need to tap into all sources of investment, public and private, foreign and domestic.

Monitoring issues

Information on private participation in infrastructure projects in low- and middle-income countries³⁷ is available from the Private Participation in Infrastructure Projects (PPIP) Database,³⁸ a joint product of the World Bank's Infrastructure Economics and Finance Department and the Public-Private Infrastructure Advisory Facility (PPIAF).

The database is updated every year through a comprehensive review of activity in each country. However it is not a comprehensive resource as small scale operators tend to be omitted because they are not reported by major news sources, databases, government websites, and other sources used by the PPI Projects database (World Bank 2009). Furthermore, the database draws its information exclusively from publicly available sources that allow for full disclosure but also carries the risk of inaccuracy (World Bank 2009).

The database highlights the contractual arrangements used to attract private investment, the sources and destination of investment flows, and information on the main investors. It provides information on more than 3,800 infrastructure projects dating from 1984 to 2007, with over 30 fields per project record, including country, financial closure year, infrastructure services provided, type of private participation, technology, capacity, project location, contract duration, private sponsors, and development bank support (World Bank 2009).

3.3 Summary of financial flows

The foregoing discussion highlights a growing number of public and private channels of mitigation specific support as well as support for sectors relevant to mitigation.

Table 2 summarises mitigation specific support today and identifies key features of available information for different types of support.

The UNFCCC has attempted to track and monitor flows of bilateral public mitigation specific support, providing important qualitative information from contributing countries about their support programmes. In addition, there is a sound statistical system emerging under the OECD DAC to provide consistent and comparable time series data on bilateral mitigation support classified as ODA; these data can be disaggregated by sector and even project endpoint. However, increasingly important flows of mitigation specific support are formally falling outside of the Convention process, notably through multilateral development banks, the CDM and South-South channels of financing. These flows are not systematically measured, reported or verified anywhere and as a result lead to a routine underestimation of mitigation specific support.

³⁷ Economies are divided according to 2007 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, \$935 or less; lower middle income, \$936 - \$3,705; upper middle income, \$3,706 - \$11,455. No Annex II country is included in the low or middle income country categories.

³⁸ Projects included in the database do not have to be entirely privately owned, financed or operated. Some have public participation as well.

Table 2: Current measurement and reporting of mitigation specific support

Type of Support	Amount	Metric	Reporting Entity	Reporting instrument and frequency	Review
National programmes & funding (art 4.3 & 4.5)	5 billion USD in 2003 ^a	monetary and qualitative	Annex II countries	National Communications under the UNFCCC (periodic – 4 to date: 94-95; 97-98; 2001-02; 2006)	UNFCCC - 3 rd party peer reviews
GEF	Average of 163 million USD /year between 2003 and 2006 (GEF third replenishment allocated to climate change focal area)	monetary	GEF	GEF annual reports; GEF report to the COP every 4 years	UNFCCC COP review every 4 years (4 th review 2006)
ODA – Bilateral Rio Markers – climate change	3.5 billion USD annual average between 2003-2007 ^{b,c}	monetary	OECD DAC – climate change marker	OECD CRS database annual reporting (recently institutionalised)	DAC-CRS statistical review
MDB mitigation specific funding	4.1 billion USD annual average between 2006 and 2007 – multilateral development finance in green energy sector. ^d Climate Investment Funds – 6.1 billion commitments (no disbursements – as of June 2008) ^d Carbon finance 2.1 billion USD total (WB has disbursed 1.6 billion as of June 2008) ^d	monetary	Individual MDBs	Consolidated database (work in progress – consistent data sets not available yet)	No review
CDM investments	44.9 billion USD in 2007 (projects in pipeline) 11.6 billion USD in 2007 (projects registered) ^b	monetary	No formal reporting	No formal reporting (Seres & Haites 2008)	None - no formal instrument

Source: Authors, drawing on various data sources compiled in this paper. Notes: a. includes bilateral contributions and contribution to GEF, excludes contributions to multilateral banks and international institutions (UNFCCC 2007b); the estimates are not additive with other amounts in the table due to overlap with these (i.e. GEF & bilateral ODA); b. reported in constant 2007 USD; c. several countries have not reported yet for 2007 so the estimates may be biased downward slightly due to some missing data points; d. currency units are not reported for these amounts.

Table 3 summarises annual flows of support for mitigation relevant sectors in recent years and identifies key features of available information. As with mitigation specific financing, some major flows of financing are missing (e.g. international loans) from this summary due to lack of data at the relevant level of detail.

Table 3: Current measurement and reporting of mitigation relevant support

Type of Support	Amount	Reporting Entity	Reporting instrument and frequency	Review
Mitigation-relevant ODA (North-South)	25.3 billion USD, average annual, 2003 - 2007 ^{a, b}	OECD DAC from member country data	OECD CRS database annual reporting (1960-2009) (Public)	OECD-CRS statistical review
Export Credits – Long-term (North-South)	31.2 billion USD, average annual (2002-2008) ^c	OECD from member country data	OECD CRS database annual reporting (1960-2008) (data is not publicly available – these estimates taken from OECD 2007c)	OECD-CRS statistical review
FDI	118 billion USD annual average (2003-05) mitigation relevant sectors, inward flows to developing countries only ^c	UNCTAD data from source and recipient countries (national accounts)	UNCTAD Statistics database annual reporting (1970-2008) (Public) – sector information periodic in UNCTAD World Investment Report (these data from UNCTAD 2007)	UNCTAD Statistical Review
Foreign Debt	Estimated to be roughly 20% of global financial flows – mitigation relevant portion unknown	Bank for international settlement (BIS) recording debt issued by banks in 40 large lending countries.	Joint external debt hub quarterly reporting. Public.	BIS Statistical Review
Investment in Sustainable Energy	30.1 USD billion in China, Brazil and India (2008) ^c	New Energy Finance and UNEP-SEFI	New Energy Finance Desktop Database -continuous reporting (Private) (these data from UNEP-SEFI and NEF, 2007)	Unclear (see Annex)
Private investment in energy transport and water infrastructure	82.3 billion USD in 2007 in developing countries (not just North-South) ^c	World Bank using data from a variety of sources	World Bank Private Participation in Infrastructure (PPI) Project Database (1984-2006) (these data from UNCTAD 2007). Public	WB cross check of information across sources

Source: Authors, drawing on various data sources compiled in this paper. Notes: a. estimates are reported in constant 2007 USD; b. several countries have not reported yet for 2007 so the estimates may be biased downward slightly due to some missing data points; c. currency units are not reported for these amounts.

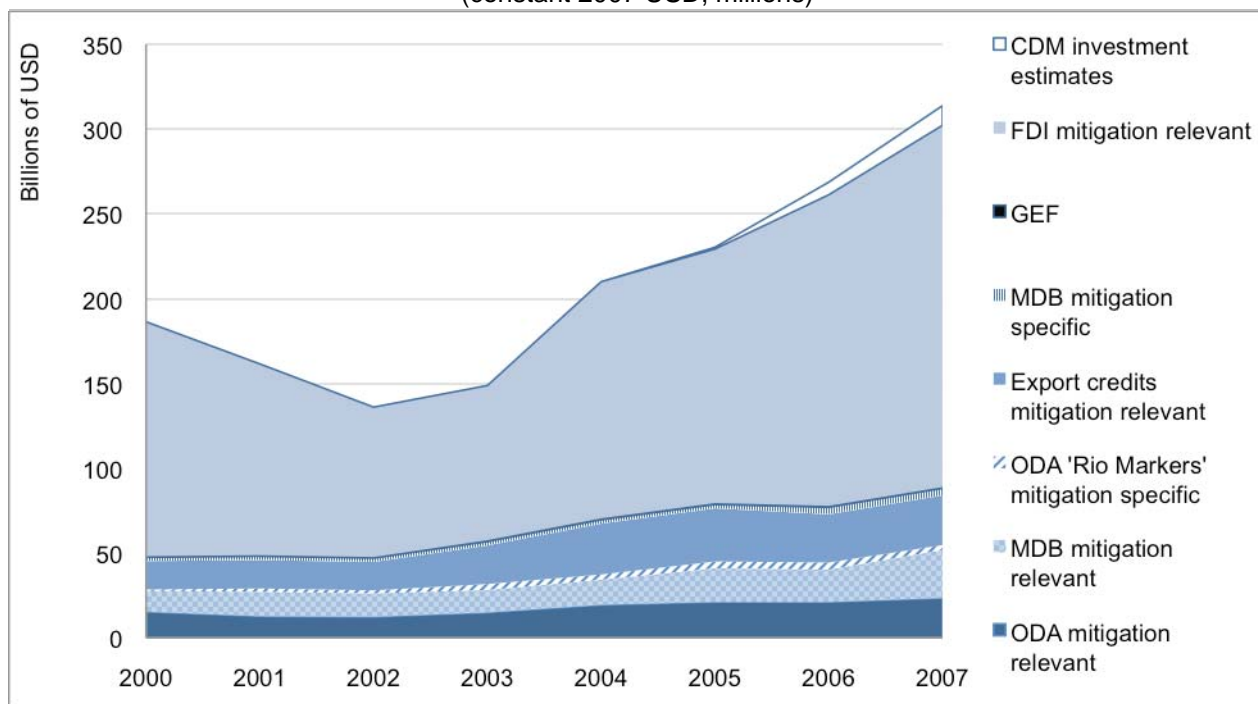
3.3.1 Public versus private support and leveraging

Overall, the private sector remains the main source of development finance and as such will be an instrumental force in any effort to harness sufficient resources to shift development onto cleaner pathways over time.

For the North-South financial flows that can be quantified, Figure 8 depicts the estimated trends in mitigation relevant versus mitigation specific finance. While there is some uncertainty in the individual estimates for any one channel, the broad trends and relationships are likely to be robust. Mitigation specific support from bilateral ODA channels is growing but is still small in relation to other North-South financing for development in mitigation relevant sectors more generally, from both the public and the

private sector. However for flows in mitigation relevant sectors it is not known whether the effect on emissions is negative or positive.

Figure 8: Estimated North-South mitigation relevant and mitigation specific investment flows: 2000-2007 (constant 2007 USD, millions)



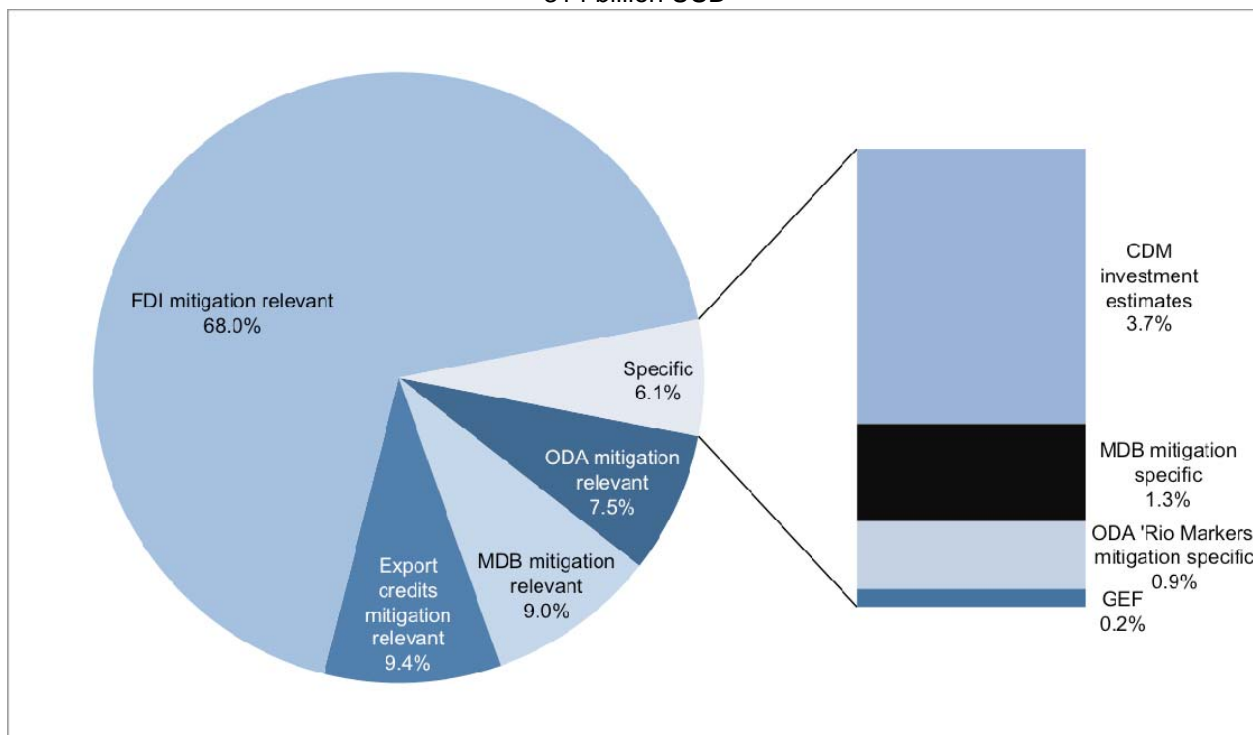
Source: Authors' estimates, based on the data sources compiled in this paper.

Notes: Mitigation relevant estimates are based on the sector analysis of various data sets. The analysis assumes that support flowing to energy, water supply and sanitation, transport, industry, extractive industries, construction, agriculture and forestry is relevant to mitigation (i.e. these sectors are likely to positively or negatively affect GHG emissions and the mitigation potential in a country for a given price of carbon). Due to limited sector data for FDI, MDB, and ECA flows, these estimates use 2003-05 sector analysis in these sources to extrapolate to the full 2000-07 period.

It is important to acknowledge the large potential leveraging effect of public sector financing where public financing can be used to guarantee or limit the risk of private sector investments in new areas (e.g. clean technologies are just becoming commercial). By leveraging private sector investment, public finance works through the well known channels of bilateral ODA, MDB loans and guarantees, and export credits to create new, commercial opportunities in clean technology and innovation pivotal to future development patterns in developing countries (Ellis et al 2007; OECD 2003). For example, detailed information available from GEF financed projects suggests that a relatively high leveraging ratio has been achieved through this public financing channel for mitigation specific projects. Since 1998, the GEF estimates that it has leveraged in total about 13 billion USD for mitigation specific activities, roughly 7 times the 1.8 billion USD invested in mitigation specific projects (GEF 2009). ODA and MDB loans can also exert large leveraging power as can carbon market finance.³⁹

³⁹ Data on the leveraging power of carbon finance for the CDM suggests a total leveraging ratio of just under 6. This is excluding the HFC projects from which represent a significant share of the CDM portfolio and for which the leveraging ratio is close to zero.

Figure 9: North-South investment flows, mitigation specific and other mitigation relevant in 2007: total est. 314 billion USD



Source: Authors' estimates, based on data sources compiled in this paper. The CDM investment estimate used here is 11.5 billion USD in 2007, based on the "projects registered" (see Section 3.2.1; Seres and Haites 2008).

Figure 9 uses the information outlined above to assess the overall blend of investment and financial sources of support relevant to mitigation, from the public and private sectors, as flowing from developed to developing countries in 2007. This shows that mitigation specific support is about 6% of total relevant flows to developing countries. Even with more optimistic of assumptions about the CDM (i.e. using the investment estimate in 2007 of 45 billion USD for projects registered), the magnitude of mitigation specific support described above remains limited relative to other "business as usual" financial flows.

In summary, of the estimated 314 billion USD to be invested in mitigation relevant sectors in 2007, mitigation specific flows are estimated to be in the range of 8-53 billion USD (or 2.5 - 16% of the total depending on whether and how CDM investments are accounted for in the estimates).⁴⁰ Comprising less than one sixth of the total in 2007, mitigation specific financing accounts for a limited share of aggregate financial and investment flows in key sectors that drive emissions intensity of the economy, mitigation potential and total emissions. Nevertheless mitigation specific flows are growing, particularly if one considers the private flows driven by the market under the CDM. Though difficult to track precisely over time due to limited data, it is clear that the public flows are growing, even if slowly. This is consistent the overall decadal observed trend towards an increased share of environmental "aid" (Roberts et al. 2009).

Due to their sheer size, other North-South private investment flows (e.g. non-climate ODA, foreign direct investment and foreign debt) will have a significant influence on overall long term emission trajectories.

⁴⁰ The lower bound excludes CDM flows and the upper bound includes CDM flows in the year that the project enters the pipeline. It is important to note that the ODA Rio Markers series for climate change in 2007 is incomplete at the time of writing, with Germany, the Netherlands and Norway not yet reporting complete information. Fully accounting for these countries could be expected to raise the upper bound of the range by at least 1 billion USD.

Although private foreign direct investment (FDI) is the largest source of international finance to support development, some developing countries do not have the necessary governance conditions and strong enabling environments, such as the rule of law, to attract significant amounts of FDI (see Box 3). In these, often very poor, countries, ODA may be relatively more important as a source of financing for the foreseeable future (Ellis et al. 2007). Thus the relative influence of foreign public finance (ODA) compared to foreign private finance (FDI) for development and presumably mitigation will vary with national context.

However combined with domestic sources of private investment, FDI is a dominant force to shape development and emission pathways in medium income developing countries, many of which have rapid growth in emissions. Domestic policy frameworks to improve energy efficiency, reform energy subsidies, and constrain and eventually put a price on carbon, will be essential to steer private investment in these countries towards low-carbon growth. These frameworks will need to build on a foundation of more fundamental policy reforms to attract and protect private investment and to stimulate innovation and transfer of technologies; these are referred to here as national enabling environments (Box 3).

Box 3. National enabling environments

National enabling environments can improve the effectiveness of support across the intersection of finance, technology and capacity building. The support of domestic policies and measures to create enabling environments will ultimately determine the success of developing country mitigation activities. North-South support for capacity building may indeed contribute to the enhancement of domestic enabling environments and eventually to frameworks that integrate climate change into sectoral and other overarching development policies. However capacity building efforts financed internationally should also be accompanied by autonomous commitment to domestic policy reform and institutional change.

A number of actions can be taken to create enabling environments for innovation and technology transfer and more generally to improve enabling environments as follows (UNFCCC 2001; McKenzie Hedger 2000; OECD forthcoming 2010):

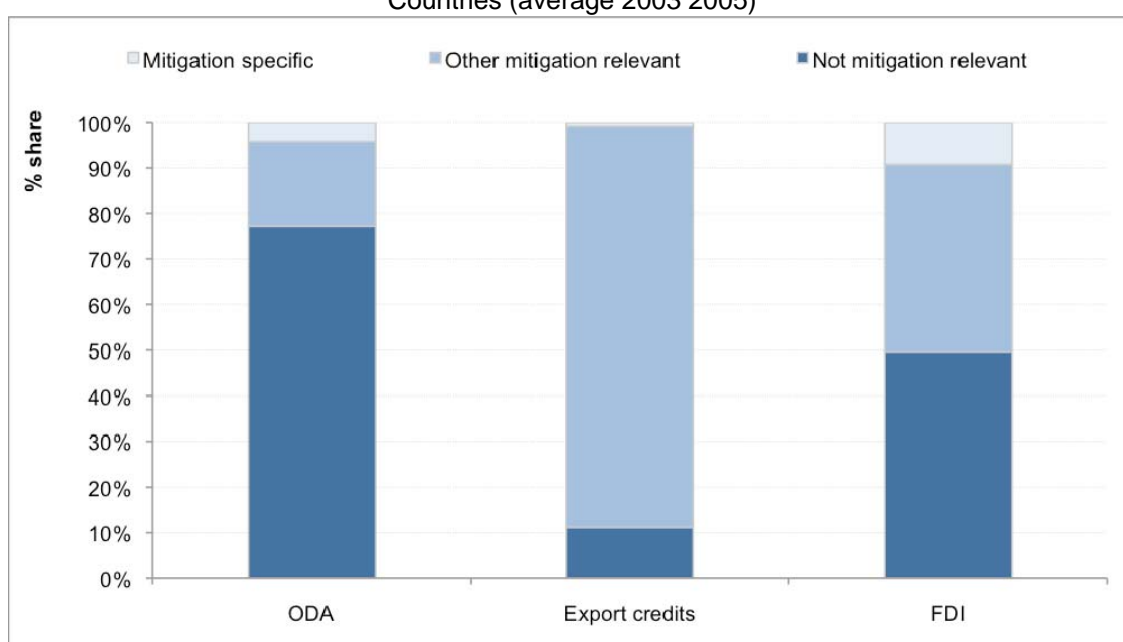
- Strengthen environmental regulatory frameworks;
- Enhance legal systems, ensuring fair trade policies;
- Utilise tax preferences and fiscal policies to incentivise investment in innovation;
- Protect intellectual property rights
- Efforts to improve technical absorptive capacity, e.g. through education and training as well as international collaboration in research and development.

OECD investment instruments (see Guidelines for Multinational Enterprises, Policy Framework for Investment, Principles for Private Sector Participation in Infrastructure) can provide practical tools to improve the capacity of both developed and developing country governments to create an enabling environment for investment through key policy areas such as industrial competition, tax and trade policies (OECD 2008c). New work in the OECD is underway to consider the possible contribution of investment and innovation policy tools to the achievement of low-carbon development strategies (OECD forthcoming 2010a and 2010b).

Potential metrics to measure progress in these areas include amongst others: intellectual property rights (IPR) protection index, the Park index, OECD indicators, trade restrictions, and economic stability (inflation) (OECD 2007b and UNFCCC 2008). Importantly, the UN FCCC Expert Group on Technology Transfer is also developing metrics to assess progress towards enhanced enabling environments for technology transfer.

Finally, Figure 10 displays the relative shares of mitigation relevant sectors for three major sources of financial mitigation support, FDI, ODA and export credits, for the period 2003-05. Even though ODA data should be interpreted with caution, as funds allocated to budgetary support and core contributions are not sector specific thus not considered to be mitigation relevant in this analysis (see above), it is significant that large shares of ECA funds and FDI also flow to mitigation relevant sectors.

Figure 10: Shares of mitigation specific and mitigation relevant ODA, Export Credits and FDI to Developing Countries (average 2003 2005)



Source: OECD-DAC 2008, OECD 2007c, UNCTAD 2008.

Note: the value of ECAs is in special drawing rights and only long-term ECA are accounted for here.

4. Discussion: an evolving MRV framework

A move towards a more comprehensive reporting system would provide a strong basis for a future MRV of mitigation support. Section 2 above highlighted the main elements of a possible framework for MRV in this area. A first step is to consider how to strengthen the monitoring and reporting system already in place under the UNFCCC, and then to extend it to include not only measurement and reporting dimensions but also verification.

4.1 Complementary information sources

The foregoing discussion points to a number of sources of information that could contribute to the MRV of mitigation specific support and complement the existing UNFCCC monitoring system. Better coverage of all North-South public flows to support mitigation would require coordination across relevant institutions and their data systems. Key partners for a comprehensive system under the UNFCCC would include the OECD DAC, UNCTAD and multilateral development banks.

The OECD CRS database is potentially useful to track end-points. The reporting of climate specific support activities is now being institutionalised and there is a high level of detail concerning sectors and projects which could be analysed to assess mitigation relevance and effects. National governments already report in a harmonised fashion, so the existing system may only need some fine tuning and expansion to

cover non-DAC donors. The same system might also be adapted for MDB reporting of mitigation specific (and relevant) financial flows. The trend towards budgetary support rather than project specific support, which allows for more flexibility in the way ODA funds are spent, may render it more difficult to track flows to mitigation specific endpoints.

National enabling environments for investment and domestic policy frameworks for mitigation will determine the ability of any nation to attract private investment for mitigation or to areas relevant to mitigation; thus, some attention to this in MRV reporting frameworks is potentially useful. Detailed information on climate relevant flows, for example in the area of capacity building, could be strengthened to allow measurement of progress towards these intermediate outcomes (e.g. elements of domestic enabling environments or indicators of technology transfer) on a country specific basis. In particular, an assessment of the trends in mitigation relevant flows can help to gauge the impact of public support activities aimed at enhancing enabling environments to channel private finance and to consider the relative influence of mitigation specific on mitigation relevant investment across both public and private sources.

Combining existing sources of private finance may also provide a more accurate picture of the evolution of activities relevant to mitigation. Data on FDI (UNCTAD) and foreign debt (BIS) provide relevant information on the broad financial trends, with FDI data allowing periodic tracking of trends at the sector end-point level. Private investment in infrastructure data (PPI World Bank) allows tracking private investment trends in activities highly relevant to mitigation i.e. in the infrastructure sectors of energy, transport and water supply and sanitation. Finally information on the CDM (World Bank; UNEP-Risoe; UNFCCC) as well as information on investments in sustainable energy are available from a number of sources (UNEP-SEFI; NEF; REN21). Combined this information allows a rough assessment of private flows of support for mitigation specific and relevant investments in the energy sector as well as, to a more limited extent, assessment of progress made towards the deployment of environmentally sustainable technologies in developing countries.

4.2 Strengths and weaknesses of key information sources

As a starting point for a future framework to measure, report and verify mitigation support, the sources of support described above may be evaluated based on the availability and quality of existing data.

Table 4 rates sources of information on both mitigation specific and mitigation relevant support. A score of “++” indicates a high level of data quality (i.e. comparability, consistency) and availability for each parameter set out in Section 2.2: country of origin, type, recipient, purpose and endpoint). A score of “+” indicates that such data exists but could be improved. A “-” score indicates that data quality/availability is low or non-existent and requires significant attention if it is to be included in a future MRV framework.

Table 4: Evaluation of quality/availability of existing mitigation support data

Financial Data Sources	Mitigation specific				Mitigation relevant		
	Bilateral climate support	ODA bilateral	ODA multilateral	CDM	ODA bilateral	ODA multilateral	FDI
Data type	National Communications	Rio Markers – OECD/CRS	No comprehensive, centralised source	Various sources	OECD CRS	No comprehensive, centralised source	UNCTAD
by origin (country)	+	++	-	-	++	-	++
by type (public or private, including leveraging)	- (public only)	- (public only)	-	-	-	-	- (private only)
by recipient	-	++	-	-	++	-	++
by purpose	+	-	-	-	++	-	-
by endpoint	-	++	-	-	+	-	+

4.3 Moving from review to verification of mitigation support

Although there has been little attention to review and verification of mitigation support to date, recent interest and discussion about an international registry mechanism highlights the need for further work in this area (Ellis et al 2009). Such a registry could provide a means to report and review progress internationally, both in the areas of nationally appropriate mitigation actions and mitigation support to fight climate change.

There is some international peer review of self-reported support under the UNFCCC system, including in-depth reviews conducted by the UNFCCC Secretariat and experts from both Annex I and non-Annex II Parties. However the Convention itself does not lay out specific guidelines for review of National Communications in this area.

To correct these and other limitations of the current review system, it may be worth developing one or several of the following options could be developed to enable verification:

- Streamline data collection to facilitate a standardised reporting and verification system, perhaps by creating a central authority or clearinghouse of all data;
- Develop detailed guidance for contributing countries to improve self reporting on technology transfer, capacity building and financing to support mitigation;
- Establish UNFCCC certification of independent verifiers and/or create robust standards for enhanced peer review or even self verification;
- Expand and use NAI National Communications for developing countries to self report the receipt and use of mitigation support (both from bilateral and multilateral sources) as well as on outcomes of support. This may require significant resources on the part of developing countries, and requiring this across the board may be unduly burdensome initially, however capacity could be built over time.

5. Conclusions

Financial support for GHG mitigation in developing countries is provided from a range of different sources: from public and private sectors, and from both developed and developing countries. There is little information available on what resources flow towards mitigation within developing countries or across developing country boundaries (South-South flows), however it is possible today to construct an initial picture of North-South financial flows in this area.

This paper focuses on North-South flows to consider how sources of mitigation support vary in terms of their relative size and importance to mitigation efforts; their type (public or private); and their purpose and/or endpoint. Such support can be “mitigation specific,” that is, targeted directly to achieve GHG reductions (e.g. funds in the GEF climate change focal area or bilateral ODA under the climate change Rio Marker). Or it can be “mitigation relevant”, that is, not targeted directly to mitigation but contributing indirectly – and either positively or negatively -- to GHG mitigation efforts. Examples of the latter include FDI or ODA flows to transport infrastructure, which may or may not act to limit GHG emissions but which will affect emission pathways. While many issues concerning measurement, reporting and verification of mitigation support remain unresolved, some initial conclusions can be drawn from available information and the existing frameworks on the important issue of financing.

First, this review demonstrates that significant amounts of North-South finance are already flowing today to support mitigation. Drawing on various sources of data, this paper estimates mitigation specific financial support flowing from developed to developing countries to be in the range of 8-53 billion USD in 2007.⁴¹ This compares to an estimated total 314 billion USD of public and private flows to relevant sectors in 2007, demonstrating that the share of flows dedicated to mitigation is still relatively small even if growing: less than one-sixth of the total relevant flows.

Second, despite growth in the amounts of mitigation specific support available, there is a large gap between what is available today and what will be needed to achieve ambitious climate mitigation goals over the long term thus calling for a scaling up of efforts in this area (UNFCCC 2007a; Kim et al. 2009).

Third, the vast majority of mitigation relevant financial flows is not targeted to lowering GHG emissions, which means that they are more likely to be contributing to the emission burden than improving it. This is the case even with respect to the flows from the public sector, where all governments have committed to work together through coherent policy frameworks to mitigate emissions, at a minimum to achieve low-carbon growth. Building a framework for proper and efficient tracking is a necessary first step to reach the long run goal that a maximum of mitigation relevant flows serve low-carbon objectives.

Fourth, private sources available to support mitigation specific or mitigation relevant activities are potentially much larger than public sources of support. Carbon markets, specifically the CDM, are the main source of private flows of mitigation specific investment in developing countries today with flows under the CDM estimated to be 1.5 to 4 times greater than other public flows of mitigation specific funding. A cumulative assessment shows that CDM flows range from 29% to 62% (depending upon the accounting method for CDM) of aggregate mitigation specific flows of financing between 2000 and 2007.

Finally, the sheer scale of private finance flows relative to public finance for mitigation relevant sectors suggests the need to use limited public finance to steer private finance towards mitigation over the long term. This assessment estimates private flows of mitigation relevant finance, from 2000-2007, to be 70%

⁴¹ The wide range of estimates for mitigation specific support results from whether and how to account for (public and private) investment in offset generating projects under the Clean Development Mechanism.

or more of the total flows, thus essentially determining development patterns and emissions profiles for the foreseeable future.

The central challenge is to reform domestic policy frameworks in developed and developing countries alike to drive change and shift private investment patterns to favour low carbon development. This can be done through the use of policy instruments that put a price on carbon and integrate climate change goals into relevant sector policies (e.g. energy, transport, water and sanitation). Thus a central goal of international (North-South) public finance should be to work in partnership with developing countries to build capacity and momentum to integrate climate change considerations into domestic policy frameworks such that they begin to cost-effectively steer private sector investments towards climate-friendly technologies and practices.

With regard to frameworks for measurement and reporting, several data and reporting systems currently track relevant financial flows across a range of sources and endpoints (e.g. UNFCCC, OECD DAC CRS, UNCTAD WIR, the World Bank and other MDB). However the availability and quality of information from these different systems varies. If the goal is to develop a comprehensive MRV framework for mitigation support, information and data collection in each of these systems will need to be further developed and harmonised to provide an internationally consistent foundation for MRV.

As an initial step in this direction, Parties could agree to develop a common reporting format and update National Communication guidelines for both developed and developing countries. Such a framework would need to address existing data gaps, methodological questions and the frequency of reporting. An improved MRV framework in the post-2012 climate regime could usefully target: how to draw on and strengthen the OECD CRS information for bilateral ODA flows to mitigation; more comprehensive reporting of multilateral ODA activities on mitigation along the lines of the OECD CRS; integrating the accounting of investment flows generated by the CDM (or similar post-2012 market mechanisms), including unilateral and public investments in these projects. A more comprehensive system would also aim to track other flows to mitigation relevant sectors so as to assess overall progress to shift financing and investment flows to low carbon endpoints. While the tracking of mitigation relevant flows will add complexity, it provides a useful starting point for an assessment of the effectiveness of mitigation specific investments.

Whatever the scope of the system, developing a broad framework to monitor, report and verify mitigation support will require coordination across relevant UNFCCC and non-UNFCCC institutions. Cooperation could be relatively informal, through enhanced data and information sharing, or it could be more formal, possibly entailing a harmonised reporting system. The latter may require significant effort and resources as each separate information source and reporting system has been established separately for different purposes. Parties may want to discuss whether a comprehensive and harmonised system is desirable and if so, how to establish and maintain it, where it should be housed and overseen. Alternatively, a routine process of review and synthesis of available information could be established as one of several different types of inputs to UNFCCC discussions in this area. Such a review may also consider more specific opportunities for co-operation between monitoring and reporting institutions/agencies over time to provide effective MRV of this information.

Parties may also want to consider how to develop verification of information on mitigation support within such a system, particularly given the absence of verification procedures in the current UNFCCC monitoring. As noted, the Convention itself does not lay out specific guidelines for review of mitigation support as reported in National Communications, nor is reported information formally cross-checked with alternative sources. Verification of mitigation support provided by contributing countries could be enhanced through reporting of information by recipient countries on the origin of support received and how support is being used.

Any effort to advance a more rigorous and comprehensive system would fill an important gap to better inform Parties about how much support is available from whom and by which channels, where it is going, and how it is being used. Over time the framework for MRV of mitigation support could be further developed to strengthen assessment of the effectiveness of support, such that Parties can learn from their initial experiences in this area and continue to refine and improve delivery mechanisms for support to reduce global GHG emissions.

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ANNEX I: Other relevant data sources

Sustainable energy technology investments – private sector

Three international initiatives are currently attempting to measure and report on investment in sustainable energy technologies and practices: New Energy Finance (NEF); UNEP Sustainable Energy Finance Initiative (SEFI); and Renewable Energy Policy Network for the 21st Century (REN 21).

NEF, a private information provider, has established a comprehensive database providing worldwide coverage of investors and transactions in clean energy (NEF 2008). NEF tracks deals across the financing continuum, from R&D funding and venture capital for technology and early stage companies through to public market financing for projects and mature companies and asset financing for capacity projects. The New Energy Finance Desktop database classifies all organisations, projects and investments according to transaction type, sector, geography and timing. It covers 20,000 organisations (including start-ups, corporate, venture capital and private equity providers, banks and other investors), 10,400 projects⁴² and 9,400 transactions. NEF continuously monitors investment in renewable energy and energy efficiency as the information flow improves and new deals come to light. Where deal values are not disclosed, NEF assigns an estimated value based on comparable transactions. Deal values are rigorously back checked and updated when further information is released.

The recent UNEP SEFI report *Global Trends in Sustainable Energy Investment 2009* uses NEF as its source data, and adds estimations of investment in small-scale technology deployment such as domestic solar systems and solar water heaters.

REN 21 is a global policy network created to promote renewable energy (REN21 2007) which provides information about the current status of renewable energy in the world. REN21 uses a top-down methodology, taking MW installed in a particular year and applying a \$/MW installation cost to estimate investment in that year's new installed capacity (and excludes biofuels).

⁴² NEF database includes biomass, geothermal and wind generation projects of more than 1MW, hydro projects of between 0.5 and 50MW, solar projects of more than 0.3MW, all marine energy projects, biofuels projects with a capacity of 1 million litres or more per year, and all energy efficiency projects that involve financial investors.

ANNEX II: List of the Mitigation Relevant ODA purpose codes by sector

Water supply & sanitation	
14010: Water resources policy/admin. mgmt	14050: Waste management/disposal
14020: Water supply & sanit. - large syst.	14081: Educ./training: water supply & sanitation
14030: Basic drinking water supply and basic sanitation	
Transport & storage	
21010: Transport policy & admin. management	21050: Air transport
21020: Road transport	21061: Storage
21030: Rail transport	21081: Educ./training in transport & storage
21040: Water transport	
Power production & other energy	
23010: Energy policy and admin. management	23065: Hydro-electric power plants
23020: Power generat./non-renewable sources	23066: Geothermal energy
23030: Power generation/renewable sources	23067: Solar energy
23040: Electrical transmission/distribution	23068: Wind power
23050: Gas distribution	23069: Ocean power
23061: Oil-fired power plants	23070: Biomass
23062: Gas-fired power plants	23081: Energy education/training
23063: Coal-fired power plants	23082: Energy research
23064: Nuclear power plants	

Agriculture, forestry & fishing	
31110: Agricultural policy & admin. management	31182: Agricultural research
31120: Agricultural development	31191: Agricultural services
31130: Agricultural land resources	31192: Plant/post-harvest prot. & pest control
31140: Agricultural water resources	31193: Agricultural financial services
31150: Agricultural inputs	31194: Agricultural co-operatives
31161: Food crop production	31195: Livestock/veterinary services
31162: Industrial crops/export crops	31210: Forestry policy & admin. management
31163: Livestock	31220: Forestry development
31164: Agrarian reform	31261: Fuelwood/charcoal
31165: Agricultural alternative development	31281: Forestry education/training
31166: Agricultural extension	31282: Forestry research
31181: Agricultural education/training	31291: Forestry services
Industry, minerals & mining	
32110: Industrial policy & admin. management	32170: Non-ferrous metal industries
32120: Industrial development	32171: Engineering
32130: Sme development	32172: Transport equipment industry
32140: Cottage industries & handicraft	32182: Technological research & development
32161: Agro-industries	32210: Mineral/mining policy & admin. management
32162: Forest industries	32220: Mineral prospection and exploration
32163: Textiles - leather & substitutes	32263: Ferrous metals
32164: Chemicals	32264: Non-ferrous metals
32165: Fertilizer plants	32265: Precious metals/materials
32166: Cement/lime/plaster	32266: Industrial minerals
32167: Energy manufacturing	32267: Fertilizer minerals
32168: Pharmaceutical production	32268: Off-shore minerals
32169: Basic metal industries	
Fossil fuel supply	
32261: Coal	32262: Oil and gas
Other mitigation relevant	
32310: Construction policy and admin. management	41081: Environmental education/training
41010: Environmental policy and admin. management	41082: Environmental research
41020: Biosphere protection	43010: Multisector aid
41030: Bio-diversity	43030: Urban development and management
41040: Site preservation	43040: Rural development
41050: Flood prevention/control	

Glossary

BioCF	BioCarbon Fund
BIS	Bank for International Settlements
CDCF	Community Development Carbon Fund
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CIF	Climate Investment Trust Funds
COP	Conference of the Parties
CRS	Creditor Reporting System
DAC	Development Assistance Committee
EGTT	Expert Group on Technology Transfer
EIT	Economy in Transition
ERU	Emission Reduction Unit
EST	Environmentally sound technology
FCPF	Forest Carbon Partnership Facility
FDI	Foreign direct investment
GEF	Global Environment Facility
GHG	Greenhouse gas
KP	Kyoto Protocol
LDCF	Least Developed Countries Fund
MDB	Multilateral development bank
MRV	Measurable, reportable and verifiable
MW	Megawatt
NCSA	National Capacity Self Assessment
NEF	New Energy Finance
ODA	Official development assistance
OECD	Organization for Economic Co-operation and Development
PATSTAT	Patent Statistical database
PPI	World Bank Private Participation in Infrastructure
PPIAF	Public-Private Infrastructure Advisory Facility
R&D	Research and development
REDD	Reducing Emissions from Deforestation and Degradation
REN 21	Renewable Energy Policy Network for the 21st Century
SCCF	Special Climate Change Fund
SEFI	UNEP Sustainable Energy Finance Initiative
TNA	Technology Needs Assessment
TT	Technology transfer
UNCTAD	UN Commission on Trade and Development
UNEP	UN Environment Program
UNFCCC	UN Framework Convention on Climate Change