

Private-Public Synergy in Financing Mitigation Projects:
Towards construction of effective financial mechanism options for
climate change mitigation in Asia

Aki Maruyama
Institute for Global Environmental Strategies
Email: maruyama@iges.or.jp

1. Introduction

In recent years, the necessity for taking measures to reduce Greenhouse Gas (GHG) emissions based on international co-operative efforts has been widely recognised as a key response to the climate change problem. In particular, developing countries in the Asian region will require significant financial assistance from developed countries in the near future to reduce GHG emissions, which are expected to grow rapidly (IPCC 1995). So far assistance for climate change mitigation has been come mainly from public financing. Despite some efforts, little progress has been made in investments in so-called climate-friendly projects which generally entail higher risks and initial costs than conventional projects. Under these circumstances, the introduction of the Clean Development Mechanism (CDM) is expected to facilitate private sector investments in GHG-reducing, climate-friendlier projects in developing countries. It can be argued that the CDM is an innovative financial mechanism in terms of giving the private sector investment incentives based on market mechanisms, thereby addressing externalities relating to GHG reductions.

This paper analyses relevant issues from a financial point of view, in order to construct wider, more efficient financial mechanism options for climate change mitigation projects in Asia. First, it presents an overview of current climate change-related financial mechanisms and their problems, arguing for the stronger private sector involvement (Sections 2 and 3). Second, it analyses the potential and barriers of the CDM as a financial mechanism to facilitate private sector investments in relevant sectors (Sections 4 and 5). It then considers the complementary roles of public funds and private investments via the CDM, and points out some of the issues for further consideration (Sections 6 and 7).

2 . Overview of current climate change-related financial mechanisms

2.1 Background

Funding sources for GHG mitigation projects in developing countries have always been one of the crucial issues in the international debate about tackling climate change. It is important to recognise that the majority of GHG emissions to date have originated from developed countries, and hence that they should take the lead in reducing domestic emissions. However, in the light of expected rapid growth of GHG emissions in developing countries,

co-operation by developing countries is also essential. So far several steps have been taken to assist developing countries in financing GHG mitigation related activities.

Article 4 of the United Nations Framework Convention on Climate Change (UNFCCC) adopted in 1992 specifies some of the funding needs¹ of developing countries, and for that purpose, the Global Environment Facility (GEF) was identified as a financial mechanism of the Convention on an interim basis. At the First Conference of the Parties (COP1), the implementation of the pilot phase of Activities Implemented Jointly (AIJ) was agreed until 2000 in order to achieve emissions reductions in a more cost-effective manner. Although there is no crediting allowed from AIJ, it is a co-operative mechanism between Annex I (developed) and non-Annex I (developing) countries where developed countries carry out mitigation projects in developing countries based on the approval of each involved party. AIJ projects utilise funds additional to Official Development Assistance (ODA) and contributions to GEF, aiming to use funds and technologies from the private sector. Furthermore, by adopting the Kyoto Protocol at COP3, Annex I countries agreed to legally binding quantitative emissions reductions commitments as well as the introduction of flexibility mechanisms (Kyoto Mechanisms) to help achieve the targets. One of these mechanisms, the Clean Development Mechanism (CDM), has the purpose of contributing to sustainable development of developing countries. It is a mechanism wherein Annex I (developed) countries implement GHG mitigation project activities in developing countries based on the approval from the governments involved, and use a part of the generated credit from the project, - Certified Emissions Reductions CER) - in order to meet their national GHG reduction targets. Although details of the CDM are scheduled to be elaborated at COP 6 in 2000, and are unclear at this point, the CDM is commonly assumed to commence from 2000 (Protocol Article 12.10) prior to the first commitment period (2008-2012). With its main source of finance expected to come from the private sector, the CDM will have significant implications for future options for financial mechanisms aiming at GHG mitigation in developing countries.

The next section of the paper reviews the status and size of climate change-related financial mechanisms, focusing on the Asian region.

2.2 Existing financial mechanisms

Global Environment Facility (GEF)

GEF² was set up as a pilot \$1.3 billion trust fund in 1991 to support funds to developing countries for projects and activities that protect the global environment and to promote sustainable development. It was restructured and replenished with over \$2 billion from 34 countries in 1994, assuming the current form of an international financial entity to support its 4 focal areas³ including climate change. An additional \$2.75 billion was pledged in March 1998, and member countries now number 165. GEF's financial assistance is to cover the difference (or increment) between the costs of a project undertaken with global environmental considerations and the costs of an alternative project that the country would have implemented under the normal circumstances. During the period 1991-1998, GEF has funded more than 500 projects in 120 countries, to a total of more than \$2 billion. Co-finance for GEF projects from other sources, public as well as private, exceeds \$5 billion. Of these investments, GEF has allocated \$753 million to climate change related projects, accounting for 38% of the number of total projects, matched by more than \$4.3 billion in co-financing (GEF1999a). There are currently 3 Operational Programmes⁴ in the climate change Portfolio (OP # 5: Removal of barriers⁵ to energy efficiency and energy conservation, OP#6: Promoting the adoption of renewable energy by removing barriers and reducing implementation costs, and OP#7: Reducing the long-term costs

of low GHG emitting technologies). The breakdown of finance allocation by programme is shown in the table below (Table 1), where the Asia-Pacific region accounts for 47% of the total funding.

Activities Implemented Jointly (AIJ)

AIJ started as a pilot programme in 1995. It currently has approximately 130 projects worldwide mainly in energy related (energy-efficiency, fuel switch, renewable energy), forest conservation and afforestation fields, most of which are hosted by economies-in-transition countries (JIQ1999). Those implemented in Asian countries and reported to the UNFCCC Secretariat as of July 1999 are 7 projects⁶ listed below. Costs of projects vary significantly, depending on the types and scale of a project and much of relative cost information are unclear or not available. Therefore, there is no available data on aggregated investment volume of AIJ projects.

Table 1 GEF financing in the Climate Change Area 1991-1998 (in million \$)

Total	1991	1992	1993	1994	1995	1996	1997	1998	Total
OP#5	0.00	29.40	15.90	0.00	6.40	55.08	38.19	42.91	187.07
OP#6	40.30	49.00	14.60	0.00	6.90	62.80	46.48	60.23	280.31
OP#7	0.00	0.00	8.12	0.00	0.00	53.50	40.84	0.33	102.79
Enabling	0.00	16.00	6.90	0.00	19.49	5.43	8.85	11.67	68.34
Short-term	19.80	45.00	7.20	0.00	6.26	4.70	10.21	21.39	114.56
Total	60.10	139.40	51.91	0.00	39.05	181.51	144.58	136.53	753.08
Asia/Pacific									
OP#5	0.00	16.50	0.00	0.00	1.00	32.80	22.00	17.16	89.46
OP#6	30.00	49.00	0.00	0.00	0.00	43.20	8.83	37.12	168.15
OP#7	0.00	0.00	0.00	0.00	0.00	49.75	0.00	0.00	49.75
Enabling	0.00	11.50	1.50	0.00	0.47	3.39	0.59	0.88	18.34
Short-term	10.00	10.00	0.00	0.00	6.26	0.00	0.00	9.19	29.19
Total	40.00	87.00	1.50	0.00	1.47	129.15	31.42	64.36	354.90

(Source: GEF / presentation by Dr. Vaish at 8th Asia-pacific climate change seminar Jun.1999)

Table 2 UNFCCC AIJ Projects in Asia (in thousand \$)

Project Name	type	Host country	Investing country	Cost	Lifetime of the activity
Installation of a Coke Dry-Quenching Facility	EEF	China	Japan	(AIJ)26,798	20yrs
Integrated Agriculture demand-side management AIJ pilot project	EEF	India	Norway	4,600	20yrs
The Model Project on Effective Utilization of Energy in Re-heating Furnace in Steel	EEF	Thailand	Japan	Cost not fixed yet.	10yrs
Reduced Impact Logging for Carbon Sequestration in East Kalimantan	FPR	Indonesia	USA	180	40yrs

Kilung-Chuu micro Hydel, Bhutan	REN	Bhutan	Netherlands	(AIJ)412	4yrs
Renewable Energy Training/Demonstration Project	REN	Indonesia	Australia	(Project)234 (AIJ)92	20yrs
SELCO-Sri Lanka rural electrification	REN	Sri Lanka	USA	not available.	29yrs

(Type : REN = Renewable Energy, EEF = Energy Efficiency, FPR= Forest preservation
 (Source: UNFCCC Homepage list as of 25.June 1999)

2.3 Other multilateral and bilateral programmes and activities

Developing countries can also seek finances for climate change mitigation projects from other sources including multilateral and regional banks, bilateral aid as well as UN agencies. Since these organisations aim to finance wider socio-economic activities, it is not possible to quantify flows specifically supportive to the Convention at an aggregate level, due to a lack of accounting /reporting for that purpose. Here, we look at programmes / projects by major financing actors which specifically address climate change.

2.3.1 Multilateral Development Banks

Asian Development Bank (ADB)

At the moment, ADB does not have particular funds or investment programmes solely dedicated to climate change mitigation (including energy efficiency or renewables etc.), however it has been actively promoting climate change related Technical Assistance (TA). In particular, a \$10 million ALGAS (Asia Least Cost Greenhouse Gas Abatement Strategy) project, which was carried out during 1995-1998 in 12 Asian developing countries⁷ was noteworthy. ALGAS has the objective of assisting participating country's capacity building for GHG inventory as well as identifying mitigation projects in line with national development goals. ALGAS has identified 81 TA and investment projects, which were presented to potential investors including donor country aid agencies, UN organisations and representatives from the private sector in July 1999. Identified projects were selected via governments of participating countries and this exercise is therefore helpful, with regard to building experience relevant to the future CDM. Moreover, ADB has launched another TA targeted at policy makers in Asian developing countries with regard to capacity building for implementation of Kyoto Mechanisms since September 1999.

World Bank

World Bank Group is also promoting various activities related to climate change. Among them, the most important activities include the roles as one of the 3 implementing agencies of GEF, involvement of some AIJ projects, and the Prototype Carbon Fund (PCF) which will be closely related to the future CDM and JI.

AIJ Projects at the World Bank are carried out in conjunction with other Bank Group investment projects which meets AIJ criteria of the UNFCCC. The concessional funding (the amounts available from a single donor in the range of \$2-5 million) comes from donors who are interested in contributing to the development of AIJ. The Bank aims at identifying a diverse portfolio, providing finance and technological assistance, and facilitating relevant research. Currently there are 8 such AIJ projects (most of which received financial contributions from the

Norwegian government), and of these, only one project in India is implemented in the Asian region.

PCF planned as a pioneering model to catalyse a carbon market, is a trust fund which seeks contributions from governments and private sector participants⁸, invests in several GHG mitigation projects in developing countries or in countries with economies in transition (EITs), and distributes its return to investors in the form of "Emissions Reductions" as per their pro rata interest in the Fund. The size of the PCF is around \$150 million. It is designed to be capable of being adjusted to operate within the UNFCCC regulatory framework as it develops, and has just been launched in January 2000.

2.3.2 Bilateral schemes

Besides AIJ projects, OECD countries such as Japan, Germany, the UK, the USA⁹ and Australia have carried out projects which contribute to climate change mitigation in Asian developing countries through respective bilateral aid. The scope and objectives of these bilateral aid programs as well as their budget vary greatly, from a research project to a concessional financing to building relative demonstration facilities. In particular, Japan's cooperation in this region is prominent in terms of financial assistance.

Main financial assistance in this area by Japanese government, first of all, is through Special Environment ODA. This was a measure announced in September 1997 to apply specially lower interest rate (Special Environment Rate¹⁰) for loans to a category of environment projects designed to improve the global environment including those for climate change mitigation (e.g. forestry, energy conservation, new energy sources and mass-transportation) and anti-pollution measures. Special environment projects in FY1998 were 27, totalling the loan amount of Y 277.3 billion on agreement basis (record high), with all loans but one are to Asian countries (in total Y 272.2 billion).

Although not a programme specifically addressing climate change in a strict sense, the Green Aid Plan - a technical and financial assistance to pollution and energy-related problem targeted at 6 Asian countries¹¹ provided by NEDO/MITI - has a component contributing to climate change mitigation. Between 1993-1997, MITI allocated over \$280 million for validity research project of energy efficiency technology transfer. It appropriated Y11.9 billion for its international energy-efficiency co-operation programme in FY 1999. Furthermore, MITI and the Environment Agency have been providing Japanese entities with financial assistance for feasibility studies of potential JI and CDM projects, aiming to identify potential projects and accumulate knowledge.

2.3.3 Activities by other regional/ international organisations

In addition to the above efforts, several regional / international organisations offer TA related to climate change mitigation. They include capacity building, research and technical assistance activities by UNEP¹², and the Asia-Pacific Climate Change Seminar for policy makers organised jointly by UN ESCAP and the Environment Agency of Japan. Being non-financial entities, the main activities of these organisations in the climate change area are not, in principle, related to investment but information dissemination and capacity building, for which the budget and scope vary from year to year.

3 . The limitations of conventional public finance

3.1 Problems with current options

Current financial mechanisms for climate change mitigation projects have several problems. General problems with GEF funding include: comparatively few funds available to achieve the ultimate objective of the Convention --i.e. the stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system -- and transfer the necessary environmentally sound technologies to developing countries; a typically lengthy process of project identification and approval for funding; consultant-driven project identification which could lead to projects which do not take regional or country needs into consideration (Porter et.al (1998), TERI (1998), ECON (1997) , related documents on UNFCCC website).

Furthermore, unequal geographical distributions of project implementation and non-existence of financial assistance mechanisms for adaptation for countries/regions particularly vulnerable to climate change are issues which require special consideration. Difficulties involved in taking concrete and efficient co-operative measures at national, regional and international levels because of uncertainty with the outcome of the future international negotiations are a major problem in strengthening the supporting efforts. As mentioned in the previous section, multilateral development banks as well as bilateral aid agencies carry out some activities related to climate change mitigation. However, it is difficult for them to strengthen their efforts or prescribe particular policies at this point when rules and modalities of the Kyoto Mechanisms are yet to be decided. Thus, early formation of international consensus is essential to strengthen necessary supporting measures.

On the other hand, although the AIJ programme aims at introducing private funds and technologies, it is difficult to say that it plays a significant role in terms of leveraging private sector finance. This is because of factors such as the absence of credit as yet for emissions reductions, and the lack of international consensus on giving the private sector appropriate incentives, thus leading to a lack of incentives other than a little public image-improvement. Moreover, the status of AIJ as a financial mechanism itself becomes obscure in conjunction with the decision taken at COP 4 to prolong its pilot phase which was originally planned to end in 2000 and the start of the CDM from 2000 (Article 12.10 of the Protocol).

Generally investments in climate-friendlier projects are difficult, due to the higher initial costs, risks and externality of GHG reductions. Because of this, the UNFCCC looked to GEF to fill the cost gap (incremental cost), in order to leverage private funds. However, as reviewed in a GEF overall performance study, there has been comparatively little mobilisation of capital from private financial institutions (GEF 1998). The private sector's involvement has been limited to providing procured equipment and services or advisory capacity. GEF identifies the causes of this obvious obstacle to be factors such as the private sector's low awareness of GEF, a lengthy approval process, private sector's fear for disclosure of valuable business information, and vague tangible benefits resulting from partnership with GEF (GEF 1999b).

3.2 Necessity of private investment

It can be argued that financial assistance for mitigation projects using limited GEF or ODA resources is not sufficiently promoting private sector investments, in the face of huge private flows to climate-relevant conventional projects in developing countries. However, the mobilisation of private sector investment is the key to achieve global GHG emissions reductions, particularly in developing countries, in terms of the size of its flows and the importance of Foreign Direct Investment (FDI) as well as the sustainability of projects.

3.2.1 Size and the importance of the FDI

A 5 year fall in ODA has ended to show a rise to \$51.5 billion in 1998, while the net private flows to developing countries fell drastically to approximately \$200 billion¹³, due to loss of confidence in emerging markets triggered by the recent financial crisis which led to the withdrawal of short-term bank flows and portfolio investments (DAC1999, World Bank 1999a). Still, private flows to developing countries are running at 3-5 times the size of ODA. FDI has been more resilient than other forms of private capital flows in the face of the financial crisis. Developing countries accounted for two-thirds of the rise in global FDI flows from the late 1980s to the 1990s, and FDI is likely to remain the dominant source of long-term finance for developing countries in the foreseeable future (World Bank 1999a). The majority of the \$96 billion net long-term flow to the East Asian region in 1998 was dominated by \$61 billion FDI, while official flows were \$19 billion (IMF credit not included) (World Bank 1999a). FDI brings not only capital but serves to diffuse advanced technologies to local industry, and to introduce institutional frameworks of the market economy such as industrial organisations, contractual concepts, transaction know-how, financial systems, and labour markets. In this respect, FDI is potentially a strong vehicle to activate developing economies (Ohno 1996). Furthermore, even when ODA or other public funds are available for mitigation projects, project replication and sustainability often depend on creating conditions for similar investments by the private sector (GEF1999b). In this respect, greening the FDI in climate relevant sector such as energy sector is essential for climate change mitigation.

3.2.2 Private sector investment in the electricity sector

Electricity generation, a primary cause of climate change, is one of the leading infrastructure sectors in attracting private investment. According to Izaguire (1998) the private sector took on the management, operation, rehabilitation or construction risk of 534 projects, with total investments of US\$131 billion between 1990 and 1997. Of these, East Asian countries won 165 contracts, representing a total investment of about US\$50 billion (Table 4). Independent power producer (IPP) projects account for nearly 60 % of all new private generation capacity financed in the developing world, and East Asian countries show a pronounced trend towards introducing private participation in this form.

Among the contracts brought to fruition during 1990-1997, large green field IPPs (exceeding 100MW) comprised 137 projects worth US\$65 billion, and of this, IPPs mobilised US\$51 billion in private funds (Babber and Schuster 1998). On the other hand, loans to the energy sector (electricity generation and gas projects) provided by MDBs or bilateral credit agencies active in the Asian region (namely, ADB, World Bank, and the Japan Bank for International Cooperation - the latter created from a merger of the Overseas Economic Co-operation Fund and Export-Import Bank of Japan) totaled approximately US\$6 billion in 1998 (Annual Report of each organisation, see Figure 1). Although these financial institutions provide loans on concessional terms, the basic principle of evaluating the project economics based on loan repayment is the same as that of commercial banks. Without relevant environmental regulation in place, and with energy prices that are unreasonably cheap due to support from governmental subsidies, justifying climate-friendlier investments which are not internalised in economic appraisals of the projects is even more difficult in developing countries than in developed countries. Hence, the cost gap for consideration of GHG emissions reductions has been addressed by using public funds with more advantageous terms, such as GEF funds or Japan's special "environmental ODA". However, as the sizes of these funds show clearly, the impact of this type of support has been limited in leveraging private investments.

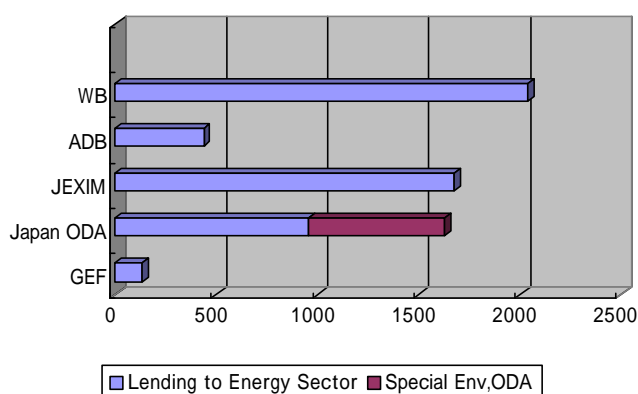
Table 3 Private electricity projects in developing countries, by region 1990-1997

(in million US\$)

Region	Projects	Total investment with private participation
Ease Asia and the Pacific	165	49,741
Europe and Central Asia	112	10,436
Latin America and the Caribbean	169	45,311
Middle East and North Africa	10	6,721
South Asia	57	16,799
Sub-Saharan Africa	21	2,040
Total	534	131,048

(source) Izaguirre (1998)

Figure1 Loans to energy sector 1998(million US\$)



(note) conversion rate @130.89 (DAC designated rate for 1998); JEXIM data is an averaged sum during 1994-1998 and loans aiming at resource import is excluded; OECF and JEXIM were merged (as JBIC) in 1999 (source) Annual Report of each organisation, the Power Resource Development Center(1999)

As we have seen, current financial flows for mitigation projects in Asian developing countries are a tiny part of relatively small official flows. The trend toward privatisation of state-owned electric utilities means that decisions about the carbon intensity of power plants will be made on the basis of economic criteria. Considering private sector investments in climate related areas which will shape the future of economic growth and environment of developing countries, such as those in the energy sector, our task must be to find ways to direct private flows to investments that contribute both economic growth and climate change mitigation.

3.3 Barriers to climate-friendly investments in developing countries

What risks and barriers are associated with climate change mitigation projects in developing countries, additional to those of conventional projects? Table 6 in Section 5 shows risks and barriers from the point of view of financiers / investors, according to project type (i.e. those associated with conventional projects (left column), climate change mitigation projects (middle column), and CDM projects (right column)). As shown in Table 6, projects in the area of climate change mitigation have additional barriers/ risks on top of those associated with conventional projects in developing countries. These include risks related to technologies (performance risks of unconventional technology itself), management (risks associated with the use of unfamiliar technologies) as well as country risks related to domestic regulatory and economic aspects (regulation on investment and import of climate-friendly technologies,

and uncertainty over energy pricing and subsidy schemes). Furthermore, there are risks of non-conventional alternative project itself, such as uncertain rates of return, incapability of analysing non-conventional projects, higher initial investment cost, or small project size and implicit transaction costs (GEF 1996, EIC1999, APEC1998,).

In order to attract more private investments in climate-friendlier projects, it is important to create a transparent and stable market where investors have realistic expectations of future returns. To this end, developing country governments should strive for reduction of investment risks and introduction of policy measures to promote mitigation technology transfer. In parallel, new financial mechanisms and measures to address incentives and risks of private investors will be necessary.

In this connection, the CDM could offer great potential in directing FDI to climate-friendlier investments by giving market-based incentives and internalising externalities associated with mitigation projects.

4 . The potential of the CDM

4.1 Significance of the CDM as an innovative financial mechanism

Kyoto Mechanisms introduced in the Kyoto Protocol provide the prospect of GHG being treated as a commodity with monetary value. Like environment taxes, Kyoto Mechanisms are innovative financial tools which internalise externalities. They could send price signals to the market, facilitating energy related cost savings and cost recovery of climate-friendly investments, thereby reducing some of the barriers associated with financing of mitigation projects. Although the details of CDM are as yet unclear, by carrying out mitigation projects in developing countries the mechanism has the potential to help developed countries to meet their national emissions-reduction targets cost effectively, while contributing to sustainable development in developing countries. Although responsibility for achieving national reductions targets rests with each government, the Kyoto Mechanisms allow participation by private entities.

Therefore, with appropriate domestic measures to give the sector incentives for investments (such as introduction of domestic emissions trading systems, early reductions rewarding schemes, voluntary reduction agreements, regulations, or tax breaks etc.), the CDM could offer cost-effective reduction options and new business opportunities. In addition, the sale of the credit generated from the CDM projects (CER: Certified Emissions Reduction) offers the prospect of recovering the high investment cost associated with climate-friendly investments, thereby reducing some of the barriers associated with financing mitigation projects. Besides, there could potentially be a variety of flexible-financing tools, ranging from conventional FDI or project finance to mutual funds similar to the PCF advanced by the World Bank. Moreover, the CDM could allow each country to take region- and country-specific institutional elements into consideration, depending on their project-screening ability. In other words, given proper identification of potential CDM projects by developing country governments, CDM flows could provide a substantial source of income, which can bring co-benefits, addressing not only GHG mitigation, but also other social development goals, such as local and regional environmental problems, rural development, poverty alleviation, and employment generation etc. (Zou, J 1999, Austin, D et.al 1998).

4.2 Potential size of the CDM

Projections are made by several studies using economic models (Table 4). Especially recent study by Zhang (2000), based on a compilation of the national communications suggest that the potential size of the CDM market could be 131.8 - 357.5MtC in terms of emissions, depending on the different trading conditions , and US\$457-4513 million US\$ in terms of annual value in 2010. This market value corresponds merely to the incremental carbon abatement cost from CDM projects. Therefore, considering the total project investment including additional FDI that was previously overlooked and would not have occurred otherwise, it can be argued that the CDM would leverage even larger flows from developed to developing countries than the incremental cost alone suggests (Austin et al 1998). Zhang's study also shows that the Asian region has the largest potential for GHG emissions reductions with China and India account for about three-quarters of the total developing countries' CDM opportunities (Table 5).

Table 4 Estimates of the Size of the CDM Market in 2010

	Size of the CDM market (MtC)	Total emissions reductions required of Annex I countries (MtC)	Contribution of the CDM
EPPA	723	1312	55%
Haites	265-575	1000	27-58%
G-Cubed	495	1102	45%
GREEN	397	1298	31%
SGM	454	1053	43%
Vrolijk	67-141	669	10-21%
Zhang	132-358	621	21-58%

(source): Zhang (2000)

Table 5 The Value of the CDM Market and the Geographical Distribution in 2010 under the Four Trading Scenarios

	No limits	50% of reduction from BAU emissions	EU ceilings	No hot air
CDM market (million US\$)	2795.6	797.4	456.9	4512.8
of which:				
China	60.28%	59.88%	59.63%	60.36%
India	15.08%	15.67%	15.92%	14.86%
Energy Exporting Countries	6.07%	5.57%	5.38%	6.28%
Dynamic Asian Economies	4.91%	4.49%	4.34%	5.09%
Brazil	0.25%	0.21%	0.20%	0.26%
Rest of the World	13.41%	14.18%	14.53%	13.14%

(source): Zhang (2000)

5. Barriers to private sector investments in the CDM: from the perspective of risks

Despite its huge potential, there are currently several obstacles for implementation of the CDM, but discussion on

unresolved issues related to the rules and design of the CDM is beyond the scope of this paper¹⁴. Even assuming that the CDM becomes fully operational, it may not be able to deliver the perfect solution for finance of mitigation projects. It could help lever relevant FDI towards climate-friendlier investments, but CERs to be generated from the CDM may be just one of the numerous elements in a project negotiation. To illustrate this point, Table 6 below summarises various risk factors from the financiers / investors' point of view.

As we have seen in Section 3.2.2, climate-friendlier mitigation projects have financing barriers in terms of risks and costs. In addition to those barriers, CDM projects have their own risks and barriers. These include (see right column of Table 6): possible disadvantages over other Kyoto Mechanisms arising from the design of the CDM which could affect cost-effectiveness and the amount of CERs to be generated, uncertainty over the ratification of the Kyoto Protocol; and uncertainty associated with the CDM market in terms of price and behaviour. There are also risks associated with the delivery of CERs. Institutional arrangements for the CDM by different host governments could be another concern. Thus, CERs could remain just one of the key factors in a project negotiation. Therefore, in ensuring project-level viability of risk management, 'considerable attention needs to be paid to developing appropriate public-private sector linkages to mobilise additional private sector financial sources' (Mundy 1999) .

Table 6 Risks associated with mitigation/ CDM projects in project finance

Conventional Projects	Mitigation Projects	CDM Projects
<ul style="list-style-type: none"> ● Project Performance (Completion, Operational) ● Technology ● Sponsor ● Management ● <i>Force majeure</i> (natural hazards etc.) ● Market (quantity, price) ● Country Regulatory: underdeveloped regulatory system in asset & finance Political: war, nationalisation Economic: Forex, currency transfer, local financing, creditworthiness of local partner and clients Social & institutional 	<p>Non-conventional project Non-conventional technology insecurity of energy source</p> <p>Regulation on investment & import of climate friendly technologies</p> <p>energy pricing/ subsidies</p> <ul style="list-style-type: none"> ● High initial costs ● Uncertain (usually low) rate of return ● Small project size & implicit transaction costs 	<ul style="list-style-type: none"> ● Ratification of Kyoto Protocol ● Rules and Design of the CDM design -amount of CER baseline, leakage, eligibility -cost-effectiveness high transaction cost, adaptation fee ● Uncertainties associated with Market (price, behaviour) ● Delivery of CER ● Institutional arrangement for CDM

Conventional Projects	Mitigation Projects	CDM Projects

(source) Author (base on Ohara (1996), APEC (1998), GEF (1996), Mundy (1999), Maruyama (1999))

6. Public-private synergy in financing mitigation projects - towards construction of efficient financial mechanism options

Thus it can be argued that investments in mitigation projects in the field and countries/ regions which attract abundant private funds, such as those involving the energy sector in the Asian region, are best made utilising private flows as much as possible, complementing them with public funds. In this regard, utilisation of the CDM, complemented by public finance, could be an ideal model to facilitate private sector investments in mitigation projects. Assuming that the CDM becomes functional, several interrelated issues including the following need to be addressed, in considering a better framework for financial mechanism options as a whole.

6.1 Financial additionality and the use of public funds

Article 12 of the Kyoto protocol does not stipulate so-called 'financial additionality'¹⁵¹ - i.e. the financial resources of the CDM as additional to existing ODA and GEF funds , although it does refer to 'additionality of emissions reductions (meaning that resultant emissions reductions must be additional to those that would have occurred in the absence of the CDM). However, a controversy exists over the use of ODA, due to the fact that the above -mentioned 'financial additionality' was a condition attached to the AIJ, and developing countries' concern about a possible shift of current ODA funds towards climate change mitigation, which is not necessarily a high priority on their development agendas. The European Community and OECD have looked at this issue and seem to have a similar view (EC1999a, EC1999b, OECD/IEA1998), while Parties to the Convention appear to have a different opinion. ODA is differentiated from other public funding on concessional terms according to the 'grant element' as defined by the Development Assistance Committee of the OECD. With no explicit definition of the term, it is unclear whether so called 'financial additionality' refers only to ODA and GEF funds, or to the use of public funds in general to ensure that CDM funding comes entirely from private investments.

However, as noted above, the use of public funds could be essential to mitigate country risks associated with conventional projects in developing countries, let alone CDM projects. As far as CDM projects that require large investments are concerned, they are likely to involve some public sector financing including ODA, for project development, project financing, country risk insurance or other purposes. With its more advantageous terms of concessionality, ODA could broaden the scope of possible CDM projects, improving economic viability and addressing externalities more flexibly. Without appropriate private-public partnerships to ensure project level risk management there is a danger of significant flows going into conventional projects. Therefore, at least financial additionality should be interpreted to allow the complementary use of public finance including ODA. On the other hand, acquiring CERs from the use of ODA to complement private finance in a CDM project is another issue, requiring further consideration. In this regard, both OECD and the EC take the stance that ODA should not necessarily be excluded from CDM projects, but should not be used to acquire CERs and suggest that ODA's portion of the CER could be used to reinvest in host countries, or contribute to them (EC 1999a, EC 1999b, OECD/IEA 1998). This principle seems appropriate in light of the spirit of ODA which aims at helping the development of developing countries. However, it cannot be denied that countries like Japan, whose ODA activities historically

show a strong presence in the field of social infrastructure including energy or environment, could face difficulties because of the budgetary constraints. Whether these countries secure other funding or argue for acquisition of CERs by ODA, it is necessary to indicate options based on firm, logical explanations.

6.2 Public-Private complementary roles for project risk mitigation

Risk mitigation measures for conventional projects in the setting of project finance include contractual agreements, financial design of the project, and insurance and guarantees provided both by the private and public financial institutions (see left column of Table 7). In considering possible future supporting measures to address risks specific to investments in mitigation projects or those of the CDM, it would be effective to examine and categorise various types of risks. We could distinguish those best covered by multilateral/ regional banks by reinforcing existing risk coverage measures, those best addressed by development of new financial products developed by the private financial institutions, or those to be covered by government guarantees or bilateral export credits. Table 7 summarises possible risk coverage measures for mitigation / CDM projects.

Table 7 Risk mitigation measures for mitigation/CDM projects

Conventional Projects	Mitigation Projects	CDM Projects
<ul style="list-style-type: none"> ● Contract Completion: Turnkey Rump-sum EPC Price: capacity payment & energy payment Long-term purchase: take or pay/take and pay contract Performance & operational: warranties etc. ● Financial design cash flow control, reserve fund, deferred payment, offshore escrow account, cash deficiency support, floor price escalation etc. ● Insurance property, business 	<ul style="list-style-type: none"> GEF grant ODA/other programmes CDM GEF non-grant financing* -contingent grants/ performance grants -contingent or concessional loan -partial risk or credit guarantees -reserve fund etc. 	<ul style="list-style-type: none"> ● Cost recovery through CER ● Reduction of transaction costs through CDM design ● Withholding offsets as buffer & Insurance to address CER delivery risk ● Price hedge (forward sale, portfolio) ● Reinforcement of risk coverage measures by MDBs to address CDM

Interruption, liability etc. ● Country risk mitigation co-financing, guarantees, insurance by export credit agencies, governmental institutions MDBs (WB,MIGA,IFC,ADB) ● Host government guarantees		related country risks ● Mutual Fund
Domestic policy and measures to reduce barriers/risks in developing countries		

Sources: Maruyama (based on Ohara (1996), APEC (1998), GEF (1996), Mundy (1999), Maruyama (1999b)
 Note: * GEF non-grant financing is a new scheme currently being examined at GEF (EIC 1999).

6.3 Private-Public complementary roles: other considerations

In considering the use of public fund to complement private investment in mitigation project, using innovative financial scheme such as the CDM, public funds including existing ODA and GEF, should also need to address the issues which private investment could not address via the CDM. These issues may include the following areas.

6.3.1 Technology transfer entailing high transaction cost

In order to transfer private funds and technologies, domestic policy measures to give the private sector incentives and financial mechanisms for technology transfer should match the kind of technologies to be transferred and corporate investment behaviour. For example, Forsyth (1999) categorised technology transfers into vertical (point-to-point relocation of technology by foreign investors) or horizontal (sharing technology with local producers) according to ownership of a technology, and further classified by presence or absence of competition between domestic and international producers (Table 8). He argues that state of art technologies which fall into Category 2 are likely to attract most investment and their transfer may be accelerated if the CDM is used to encourage this type of investment, even though the ownership of the technology remains in foreign hands¹⁶. On the other hand, he continues, the technology transfer currently discussed in the climate change negotiations represents horizontal transfer of Category 4 which is unlikely to attract much investment, because of extra costs required in sharing technologies, setting up joint ventures and transfer of intellectual property rights. In this category, therefore, public funds might find the best scope for value-added. Public funds including financial assistance by GEF or ODA could be used to cover the high transaction costs associated with this type of technology transfer. They can also be used to diffuse state of the art technologies already transferred (vertically) by the CDM, to local industry.

In current practice, there seem to be broadly two ways of providing grants to support technology transfer; one is providing funds to construct demonstration facilities, the other is to cover the license fee - though this is a very rare case (there is an example in GEF OP#5: China industrial boiler project where it covered license fee to obtain energy efficient industry boilers from developed countries). However, companies usually prefer demonstration facilities as a reference case to enter into a new market, so putting them in an advantageous position in International Competitive Bidding (Evanco 1999). Therefore, technology transfers requiring setting up a joint venture, license for sharing technologies or a process of training would be difficult and costly for private companies, without financial support from public sources.

Thus, it is necessary to examine financial mechanisms and policies to give incentives to the private sector, taking into account the types of technologies transferred and investment behaviour.

Table 8 Different Investment Niches for Technology Transfer

	EXPERTISE AND ECONOMIC BASE IN TECHNOLOGY EXISTS LOCALLY	EXPERTISE AND ECONOMIC BASE IN TECHNOLOGY DOES NOT EXIST LOCALLY
Vertical technology transfer (ownership remains with investor)	1: associated with high competition and low profit margins	2: most attractive to new foreign investor
Horizontal technology transfer (ownership is shared with local	3: least attractive to new foreign investor	4 : associated with high transaction costs and potential loss of

producers)		competitiveness
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(source) Forsyth (1999)

6.3.2 Creation of an enabling environment for private sector investments

Creating an enabling environment for private sector investments is also an area where public funds show clear advantage over private flows. Efforts in this area may include institutional capacity building in developing countries to help prepare for CDM project implementation, or education and relevant information dissemination. Funding feasibility studies for the identification of potential CDM projects, similar to the approach taken by the Japanese government, or maintenance of a project's surrounding environment, would be another effective means to facilitate private sector investments (Maruyama 1999a).

6.3.3 Regional balance

AIJ experiences suggest the possibility of an inequitable distribution of future CDM projects. This would be a serious problem for regions such as Africa that are already facing difficulties with attracting private flows. Projects in regions with poor infrastructure for private investment are accompanied by higher risks, and are difficult to attract private partners for GHG reduction business opportunities. Public funds could be used to cope with regional imbalances, for instance, by creating a fund dedicated to implementation of GHG reduction projects in a particular region.

6.3.4 Technological innovation

Another area where public finance has a comparative advantage is support for R&D of GHG reduction technologies in developed countries and implementation of demonstration projects. Support in this area would not only promote innovation of GHG reduction technologies, but also contribute indirectly to future technology transfer of these technologies via the CDM.

7. Conclusion

As we have seen, when we consider attainment of the ultimate objectives of the UNFCCC -- i.e. the stabilisation of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system -- it can be argued that current financial mechanism options available for mitigation projects in developing countries are not sufficient to address risks and externalities of required climate-friendly technology transfer. There are limitations in conventional public finance of mitigation projects, in the face of huge private flows

in climate relevant sector in developing countries. Therefore, it is necessary that the focus of climate change related financial mechanisms should shift from technology and funds transfer from public sector to the one from the private sector.

In this sense, innovative financial mechanism, the CDM, would offer great potential in helping direct FDI in relevant sector towards climate-friendlier investments, by giving the private sector commercial incentives to invest in mitigation projects and thereby facilitating internalisation of externality of climate-friendlier investment. However, due to additional risks and barriers involved in CDM projects, appropriate public-private linkage would be necessary. Assuming the CDM becomes functional, in order to construct wider and more efficient options for climate change-related financial mechanisms, it would be necessary to take a holistic approach, making the best use of market enhancing functions of various public funds to complement private investment via the CDM. In doing so, relevant parties should examine a host of factors such as private sector investment behaviour, risk sharing, and areas where the private sector is difficult to address.

Furthermore, there are issues which will require careful consideration such as the relationship between the public financial supporting measures and OECD investment rules¹⁷ or rules of the World Trade Organisation (WTO). On a long-term basis, climate concerns could be incorporated as one of the important factors in country specific aid strategies. At the same time, it would become increasingly important that developing country governments should strive for the reduction of investment risks and the introduction of policy measures to promote climate-friendlier technology transfer and energy sector reforms.

Additional remarks

This paper is based on an article by the author 'Towards the construction of effective financial mechanism options for climate change mitigation - Utilisation of the Clean Development Mechanism (CDM) and its possibility' published in Japanese in Journal of International Development Studies Vol 9.No1.2000. The views expressed in this paper are those of the author and should not attributed to the organisation to which the author belongs.

Notes

- 1 These include: providing agreed full incremental costs' of implementing GHG abatement measures, including communication on GHG inventories, transfer of technologies of developing countries, cost of adaptation and development of capacities.
- 2 GEF is managed by 3 implementing agencies which assume different responsibilities: UNDP, World Bank and UNEP.
- 3 They are climate change, biodiversity, international waters and depletion of the ozone layer.
- 4 Operational Programmes, which consist of majority of GEF financial assistance, are conceptual and planning frameworks for implementation of a set of projects. In addition, GEF has other financial assistance categories; Enabling Activities; Short-term Response Measures Project Development Facility; Small Grants Programme; Medium-sized Projects.
- 5 The barriers in 'barrier removal' refers to incremental expenditure to win-win finance flows. These include: regulatory barriers and biases, lack of information, insufficient management capability, inability to analyse non-traditional projects, higher perceived technology risk of the alternative, high transaction costs, and high initial costs (GEF 1996).
- 6 There are many projects which have not been reported to the UNFCCC secretariat but are agreed and approved as AIJ by involved governments.

- 7 Bangladesh,China,India,Indonesia,Mongolia,Myanmar,Pakistan,Philippines,Rep.ofKorea,Thailand,Vietnam,D.P.R.of Korea
- 8 The required contributions for Public Sector and Private Sector participants are \$10million and \$5million, respectively (World Bank 1999).
- 9 For instance, US Country Studies by government of the USA provides technical and financial assistance to GHG inventory preparation and vulnerability assessment in 56 developing and EIT countries since 1992.
- 10 As of August 1999, the interest rate is 0.75% with 40years of grace period (which is the same terms by IDA, the most advantageous conditions in the world; for middle-income countries the applied rate is 1.8% with 25 years of grace period).
- 11 China, Thailand, Indonesia, Philippines, Malaysia and India
- 12 For example, NCSP (The National Communications Support Programme) by UNEP Collaborating Institute in Norway, UNCEE etc.
- 13 According to DAC statistics, the net private flows from OECD countries were US\$181 billion (of this, FDI was US\$110 billion).
- 14 Regarding issues related to the design of the mechanism, refer to IGES(1998),Grubb M(1999), UNDP(1998).
- 15 For other interpretation of 'additionality', refer to Baumert (1999) The Clean Development Mechanism: Understanding Additionality, World Resource Institute, CSDA Reports and Publications, Center for Sustainable Development in the Americas.
- 16 In this case, although host countries could not share technologies, it generates benefits such as employment opportunities and job training and accumulation. of knowledge. However there is a need for domestic / international measures so that the CDM could not damage competing industries in developing countries by rewarding the growth in market shares.(Forsyth 1999)
- 17 In particular, the Helsinki package agreed by OECD countries in 1991 which bans the use of aid and tied export credit together in financing projects in developing countries, with the exception of commercially-non-viable projects.

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