

Designing Climate Finance to Enhance Low-Carbon Investment through Local Intermediaries

Applying a Concept of Direct Access to Climate Finance

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Abstract

Investment in low carbon technologies has been growing over the past few years. However, in order to replace conventional high energy/high carbon intensity technologies with low carbon ones and reduce GHG emissions, innovative financial schemes are needed in order to effectively utilise limited global financing resources. Such limited financial resources should be provided as incentives or back-ups to actors within low-carbon investment such as investors, lenders and enterprises, rather than provided directly to low-carbon projects, for scaling up financing and escalating the speed of low-carbon technology disseminations. At the same time, small-scale enterprises (small- and medium-sized enterprises; SMEs) comprising more than 80% of all enterprises in some developing countries play an important role in disseminating low carbon technologies and advancing low carbon development. Thus, innovative financial mechanisms and national policies are needed to enhance the activities of SMEs and mitigate barriers and risks associated with low carbon technologies, including those specific to SMEs. The combination of public and private finance that effectively utilises national and international financial mechanisms can build up more robust national financing schemes while strengthening the capacity of local financial institutes. Some good examples of national based financing schemes already exist. This paper examines the best options among innovative national financing schemes to enhance low carbon investment by identifying and examining the barriers and benefits of low carbon investments and multi level financing mechanisms.

Key Words: *Climate finance, low carbon technology, small- and medium-sized enterprises (SMEs), national fund, local financial institutes, direct access, local intermediaries, measurement, reporting, and verification (MRV)*

The views expressed in this working paper are those of the authors and do not necessarily represent those of IGES. Working papers describe research in progress by the authors and are published to elicit comments and to further debate.

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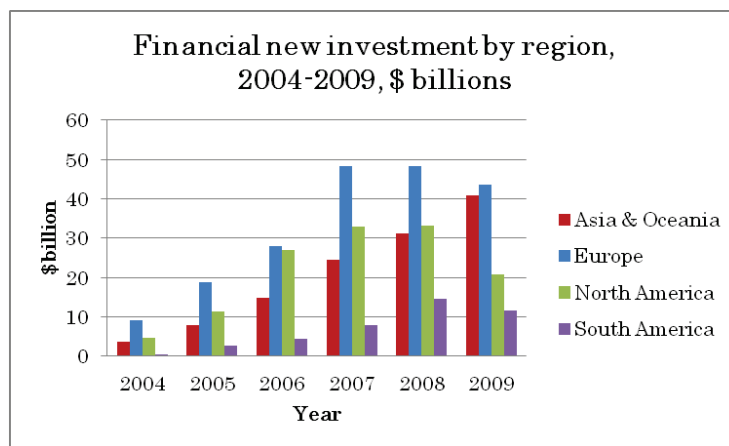
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1. Introduction

There is a growing trend in private finance of financial investment in renewable energy. Especially rapid growth can be observed in Asian and Oceanian countries. As Fig. 1 shows, new investment in renewable energy in Asia grew from \$3.7 billion in 2004 to \$40.8 billion in 2009 (UNEP 2010). The increasing international financial investment in

renewable energy and energy efficiency projects can be also seen in annual lending of the World Bank and other public finance. In the fiscal years of 2005-2009 period, the World Bank lent more than US\$9 billion for renewable energy and energy efficiency (RE/EE), US\$7 billion more than its lending from 2000 to 2004 (The World Bank (WB) 2009).

Figure 1. Financial new investment by region 2004-2009



Source: UNEP 2010

Moreover, under the international negotiation, the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP) at its session in Cancun, developed countries committed to mobilise US\$100 billion per year by 2020 aiming at addressing GHG emission mitigation needs of developing countries (UNFCCC 2010). Since then, a sizable amount of literature has studied the feasibility of mobilising US\$100 billion by utilising various financial sources including both public and private, and bilateral and multilateral funding (UN 2010, Streck et al. 2011, Stedelmannel et al. 2011a).

Despite the growing investment in RE/EE projects, the total investment within private capital markets is still small and many projects face difficulties in receiving funding through banks (GIZ 2011). Beyond this, private companies do not have much incentive to develop markets in the RE/EE field.

Uncertainties in project operations and also profitability inhibit the investment of private capital in low-carbon projects. Risks for low-carbon technology projects have been identified as high upfront costs, market regulatory barriers, unfamiliarity of the technology, and a lack of credibility of a project developer and private company in the emerging market (UNEP 2008). Many countries have experienced insufficient mobilisation of private investments into markets because of these and other risks acknowledged as characterising low-carbon investments (UNEP 2008). Not enough investment has been disseminated to replace the high energy intensity technologies and facilities that have been introduced within the context of rapid development and urbanisation in developing countries.

Furthermore, although a substantial amount of literature discusses innovative financial mechanisms

to mobilise funds and various funding mechanisms have been established, clear impacts of these mechanisms have not been observed, in that similar barriers still exist. While international organisations realise that strong commitments to domestic mitigation by governments and multiple layers of public funds are crucial to develop low-carbon technology and initiate low-carbon investments, difficulties in mobilising low-carbon investments through conventional financial schemes seems to be attributable mainly to two reasons, namely, the lack of capacity of domestic intermediaries to manage the funds and distribute it to domestic enterprises, and insufficient financial support to the domestic financial institutes to be funded for building up their capacity. Although many international funds are structures to be distributed directly to a project, in developing countries, these direct investments have built up neither the capacity nor the systems for domestic financial institutes to develop domestic financial systems. Among the reasons why international funds have not encouraged developing countries to develop their own financing systems are measurement, reporting, and verification (MRV) issues of the fund management, including monitoring and tracking issues of the fund.

In light of these circumstances, this paper will examine how potential financing schemes will deploy low-carbon technologies on the ground by responding to immediate financial needs for low-carbon development at first, and focus on how a feasible domestic fund can be designed by applying a concept of direct access² as a financing approach, and how funding schemes can develop such domestic systems and monitoring mechanisms.

Creating innovative financial schemes is essential within the momentum for expanding low-carbon investment markets and advancing discussions of climate finance, as well as for establishing the Green Climate Fund (GCF). In discussing the issues

inherent to this topic, firstly this paper identifies the current barriers associated with low-carbon investments (section 2) and benefits of overcoming the barriers (section 3). This analysis will help to consider which elements need to be examined carefully in the course of designing an effective financial scheme. Section 4 discusses national funds, international support, and other effective and beneficial financial modalities for the promotion of low-carbon technologies. It then explores potential options for different financing schemes via a case study implemented in different countries (section 4.4) and then introduces suggested financial designs (section 4.5). After the conclusion in section 5, section 6 presents a recommendation for developing an innovative financial mechanism to strengthen the capacity of local financial institutes and create a local monitoring and reporting system of the fund based on a study on barriers and benefits of low carbon technology investment and an analysis of conventional financial schemes.

The primary study will be based on the following four assumptions.

- Small-scaled enterprises (small- and medium-sized enterprises, or “SMEs”) play an important role in developing and disseminating low-carbon technologies (UNEP 2010, WB 2009). However, although SMEs are key actors in deploying sustainable technologies and providing services at the local level, financial schemes for low-carbon technologies targeting SMEs are still under development (IFC 2010). In order to mitigate high upfront costs and reduce the high risks associated with investment in low-carbon technologies and SMEs in developing countries, policy and market instruments such as tools and incentives resilient to risk should be available, especially to SMEs (sections 2 & 3).
- Currently available financial sources to enhance clean energy investment have been formulated in accordance with various mechanisms at the national and international levels. However, in order to expand investment in low-carbon

² “Direct Access” has raised considerable interest among the international climate change community in the context of Adaptation Fund. The paper use the word as the following principle behind the approach; “direct access is to increase the level of country ownership, oversight, and involvement in activities, and to create stronger accountability of a developing country” (Craeynest and Gallagher (2010) and ODI (2010)).

technology, a combination of three elements is needed, specifically 1) national policies to support low-carbon technologies and promote low-carbon businesses, 2) national financial schemes to invest in low-carbon technologies and 3) international funds to support these financial schemes or projects. These instruments should be carefully examined, selected and applied (section 4).

- In order to increase financial accessibility by SMEs and to develop and disseminate low-carbon technology and energy efficiency projects, innovative financial schemes are needed to reduce upfront costs and administration costs. Local financial institutions will be potential financial providers having lists of potential clients and their track records (section 4).
- While public and private finance are among the options for investing in renewable energy and energy efficiency projects, the market mechanism is an additional financial option for enhancing investment. (This relevance notwithstanding, this issue is beyond the scope of this paper.)

Based on these assumptions, an innovative and effective financial scheme will be assessed as a recommendation (section 6).

2. Concerns and barriers for investing in RE/EE projects

There are several concerns and barriers for investing in low-carbon technologies and deploying them in developing countries, especially for SMEs. This section identifies barriers for investing in low-carbon projects. By identifying the risks and barriers associated with low-carbon investments, methods to make low-carbon investments more attractive can be analysed and a proposal to improve the conditions of investment and key instruments for promoting low-carbon technologies can be examined in the following section (section 3).

2.1. Various risks are identified in low-carbon

technologies in accordance with the location, political and market conditions, etc

In accordance with the characteristics of a project, its location and the capacity of the host country and project developer, there are different risks, including country/political risks, policy risks, financial risks and operational risks (UNEP 2008, UNEP 2009, Wustenhagenn and Menichetti 2011). The country in which a project/programme is situated may not have sufficient political stability or property rights that are secured sufficiently to ensure continued operation. Risks in such countries arise due to war, revolution, insurgency, terrorism, civil unrest, expropriation, nationalisation, and inability to enforce contracts. Changes in the legal or regulatory regime and the instability of the policy environment, such as the failure of governments to implement stated climate change-related policy plans are also among the risks. Furthermore, international financial support can induce exchange rate fluctuations, high volatility of the local currency and inflation, which can undermine the profitability of an investment by adversely affecting the financial performance of the project. Especially for SMEs, execution poses risks with regard to local project developers/firms operating the project effectively. New technologies or systems may not work as anticipated due to lack of finance or institutional capacity, or due to unpredictable natural disasters. Lack of sufficient deal flow can also occur, with a shortage of commercially attractive and easily executable deals to deploy capital. These risk intensities are different for each country and project.

Small-scale projects in developing countries, for instance, have faced difficulties in obtaining financial support for initiation, due to the small returns generated despite high risks. The funding proposal for a small-scale biogas project was declined for various reasons, such as the project being an unattractive proposition for debt financiers, a small-sized project in a high-risk country, limited experience in the projects by an unknown host company, increased risk of inadequate feedstock supply, a relatively new factory without a proven track record and remoteness of the project, etc

(UNFCCC 2005, UNFCCC 2006).

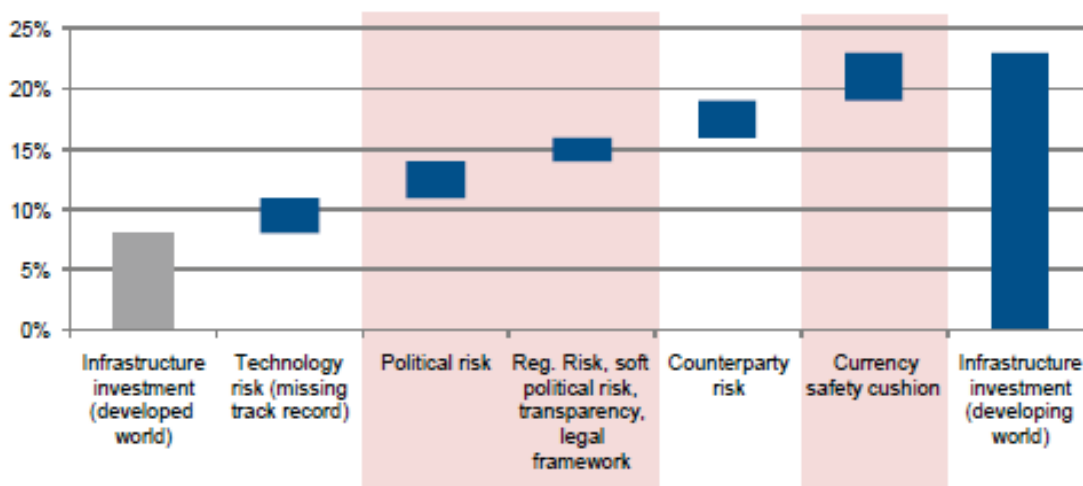
2.2. RE/EE projects are characterised as low investment return in high risk

One of the barriers of a low-carbon project is the project’s risk-reward ratio. Low-carbon projects typically provide low investment returns over the short term. The risk-reward ratio of a RE/EE project is an indicator for investors in the private sector for assessing market feasibility and cost-effectiveness (Brown J and M Jacobs, 2011). Risk is calculated by

comparing the expected returns of an investment with the amount of risks undertaken to capture these returns.

As Fig. 2 shows (Deutsche Bank Group [DB] 2011, Sarkar and Singh 2010), expected equity returns on investment increase with the additional risks of a project in developing countries due to risks against low-carbon technologies. High risk means that equity investors demand higher return on investment from the project.

Figure 2. Total expected equity return in developing countries



Source: Deutsche Bank Group 2011

In comparing the risk-reward ratio of conventional technologies vis-à-vis low-carbon technologies, while people in developing countries realise that conventional technology is unsustainable, they rely on existing technologies, which serve as a quick, cheap and easy development tool of urbanisation (Sarkar 2010). Therefore, efforts to create effective climate finance are required to improve the risk-reward ratio by filling the gaps between the cost of RE/EE technology and that of conventional energy sources, and to create economically beneficial RE/EE businesses to scale up financing RE/EE in developing countries.

2.3 Low-carbon technologies such as RE/EE require a long-term payback period, but are characterised as having a short-term technology lifecycle with high initial investment cost

In the case of RE/EE, economic assessments of a project usually include the cost of a lifetime cycle of a low-carbon technology; investment cost (initial capital expenditure and development costs), the depreciation and financing costs (debt and equity), and the operation and maintenance costs (Morthorst 2002). Major drivers of the costs of RE/EE technologies are, in the initial phase, higher equity internal rate of return (IRR) expectations, the need

for a long-term loan payout period and a high debt ratio. In the operational phase, running costs and the depreciation of RE/EE technologies, the high learning rate and scale effects and the need for a technology track record result in increasing costs.

In RE technologies such as solar power generation and hybrid cars, or low-carbon infrastructures, the life expectancies of these technologies are usually shorter than the investment payout periods due to high investment costs (NIES 2009). Thus, if a selection of technology is made in line with the investment payout periods (about 3 years), only limited mitigation measures, such as installing energy efficiency devices, can be chosen. Within the selection criteria of technologies, sufficient mitigation impact cannot be expected due to the small impact of energy consumption reductions.

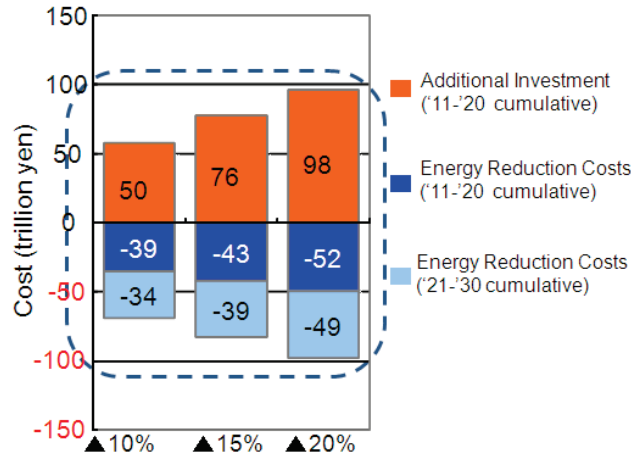
3. Benefits from RE/EE projects through investing for the long term while improving investment conditions

Although there are many constraints and barriers for carrying out RE/EE projects, as seen in the previous section, various studies have also shown the benefits from RE/EE implementation over the long term (DB 2011, NIES 2009, Blyth and Savage 2011). This section analyses benefits from implementing RE/EE projects and tools to improve investment conditions. The risk-reward ratio can be improved through reducing dependency on fossil fuel use (section 3.2), consideration of the monetary value of social and environmental effects of RE/EE projects over the long term (section 3.3), financial tools to support

long-term investments (section 3.4), and the application of appropriate risk mitigation tools (section 3.5). The barriers for low-carbon technology can be removed by using these methods with long-term strategies.

3.1. Analysis of economical benefits and cost-benefits should be done in balancing between the investment costs of a low-carbon technology and the benefits from the impacts of low-carbon technology implementation by counting energy savings and CO2 mitigations in both short and long term

The costs of a RE/EE technology are described as higher capital intensity with a higher proportion of total cost, but operation and maintenance costs are comparatively minimal over the longer term (DB 2011). If an asset value falls below its liabilities, short term loans are unlikely to return their payment. On the other hand, loans with long-term payment can reduce the payment of current liabilities. A study by NIES in 2009 examined long-term benefits. As shown in Fig. 3, investment costs will be recovered and offset over the longer term. Reduction effects of GHG emissions by investing in RE/EE technologies for 10 years from 2011 to 2020 will contribute not only to reductions in energy costs from 2011 to 2020, but also to reductions in such costs from 2021 onwards. Therefore, financial tools to make the payout period longer are needed to select cost-effective measures and technologies, as well as to make the maximum use of financial resources (see the details in section 3.4).

Figure 3. Balance of additional investment and energy reduction costs to 2020 and 2030.

Source: NIES 2009 and 2010

3.2. RE/EE projects are more beneficial in reducing the volatilities of the operational cost and its risk premium

According to an economic analysis of renewable energy and energy efficiency (Blyth and Savage 2011, Bhattacharya and Kojima 2010), financing low-carbon technology is not as risky as it is currently perceived. On the contrary, benefits from energy efficiency projects can reduce the credit risk of borrowings in the short and long term by reducing their exposure to volatilities of energy costs and market fluctuations. According to the study undertaken by Blyth and Savage (2011), the effect of credit risk reduction by implementing EE projects “lead[s] to an average reduction of about 1 percentage point (100 basis points) on the credit spread.” Blyth and Savage (2011) estimated that energy efficiency projects also can cover 9% of current liabilities (varying from 0.2% to 69% in companies) by energy saving. By strengthening the vulnerability against fuel price fluctuation, the project developers can reduce their cost of credit, and stimulate lending of energy efficiency loans. This is because EE projects not only reduce energy consumption, but also reduce the volatility of profits in flows which are affected by fuel price.

3.3. A long-term investment period and financial tools to improve the risk-reward ratio are needed for low-carbon technology development

Investment decisions by private investors are based on long-term predictability of capturing returns (Blyth and Savage 2011). Therefore, it is crucial that national and international financial resources are utilised to minimise or remove short-term investment risks, and to improve the predictability and profitability. Cash flow and balance sheet management are also important to improve the risk ratio.

Thus, the selection of risk management tools by each actor should also be carefully designed to attract the market while avoiding market distortions. Financial instruments should not encourage lending to un-creditworthy organisations and should not lend at inappropriate interest rates that fail to reflect actual market risks. The careful consideration of strategy is needed to ensure consistent cash flow to RE/EE projects when financial support with public finance is withdrawn. For example, if the liquidity of the market is a problem for RE/EE businesses, longer loan tenor to improve the asset-liability ratio, technical assistance to improve risk management, or subsidies to improve the market rates are options for

improving the condition of RE/EE projects.

3.4. Investment return can be improved by applying and carefully selecting risk mitigation tools to take immediate actions for low-carbon development in developing countries

There is a range of available financial instruments to reduce the risk exposure of RE/EE projects. By either mitigating the risks with public finance or enhancing the attractiveness of financial return of the project with policies promoting RE/EE, the risk-reward ratio can be improved.

Risk mitigation refers to hedging risks associated with projects, markets, or counterparties, while public guarantees can cover incremental costs of risks through insurance-like tools. Concessional loans and grants support upfront or initial costs, and cover incremental costs against high risks and uncertainty. Various tools can be applied to enhance RE/EE investment and promote ESCO businesses. Financial tools are provided either directly to projects or through intermediaries. It depends on which tools an investor wants to use, and for what purpose. As listed in the Appendix, financial instruments to enhance low-carbon investments can be classified into four types: 1) grant to cover initial and upfront costs and provide technical assistance; 2) loan elements to enhance the lending capacity of local financial institutes; 3) risk guarantees to reduce incremental costs and mitigate risk; and 4) market risk hedge facilities to prevent market losses and other market risks. These financial tools should be carefully chosen and applied to maximize effectiveness. Pros and cons of various financial tools to promote LCS and mitigate risks are listed in the Appendix.

4. Designing a financial scheme to improve low-carbon investment conditions and to scale up low-carbon investments

In order to design effective and innovative financial schemes, firstly careful identification of public and private finance in terms of usage and implementation

is needed (section 4.1). Secondly, the selection and design of financial modalities should be arranged to fit in the national climate change strategies and the priorities of the national climate change action plan (section 4.2). In addition, government commitments and national plans and regulations are imperative for long-term sustainable low-carbon investment in a country (section 4.3), and case studies of financial design using national/local intermediaries are introduced (section 4.4). Finally, in line with the issues listed above, effective and innovative financial schemes to scale up low-carbon investments will be suggested in section 4.5.

4.1. Mutual support of public finance and private finance can scale up low-carbon investment

As a function of public and private finance, while public finance often covers incremental costs of primary sources, private capital investment is one option to scale up financing climate change mitigation and adaptation (UNEP 2008, UNEP 2009). The necessary funds can be complemented by private capital flows. Private investment stimulates the transitions to low-carbon technology and low-carbon energy supply systems.

Various innovative finance schemes have been developed over the past decade in different sectors. Equity finance can be, for example, provided through public-private partnerships (Brown J and M Jacobs, 2011). Such partnerships substitute mutual needs, while national and international public organisations unlock private investments to correct for a lack of capital in the early stage of a project and a lack of viability through management support, technical assistance and capacity building, enabling private investors investing in equity to expect high returns.

The establishment of newer Public Private Partnership funds such as GEEREF³ also expand the usage and function of public grants by supporting

³ GEEREF is a Public Private Partnership (PPP) drawn from the Patient Capital Initiative (PCI) as an innovative Fund-of-Funds, providing global risk capital through private investment for energy efficiency and renewable energy projects in developing countries and economies in transition (<http://geeref.com/posts/display/1>)

subordination with backing with public grants or concessional loans (Stadelmann & Newcombe 2011). This financial scheme has a comparative advantage to conventional grants, since public grants are used not for actual spending, but for enabling subordinated equity and enhancing the opportunities for private finance to come into the low-carbon market.

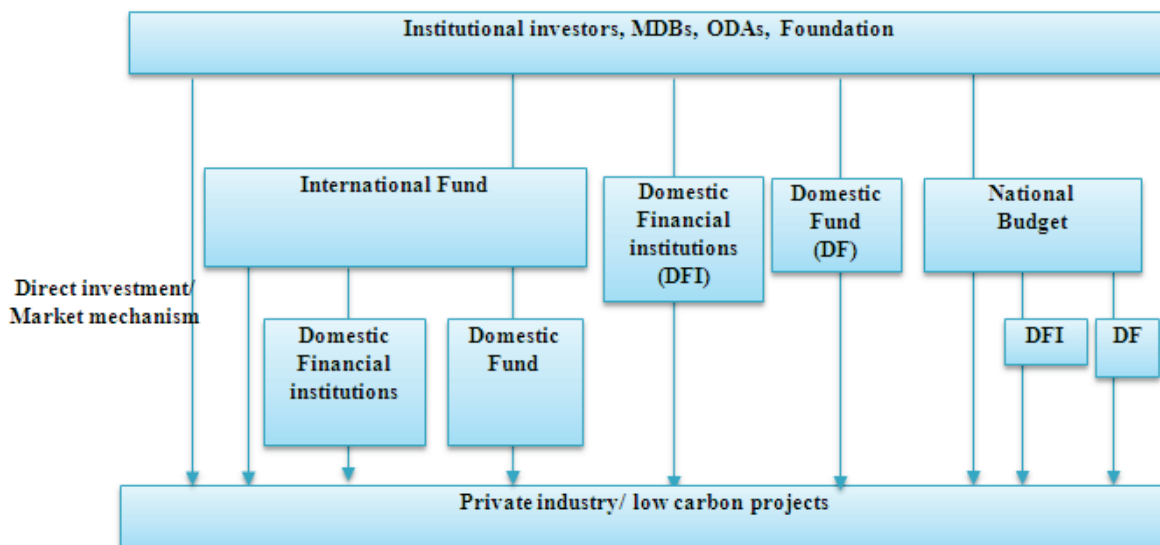
4.2. Climate fund can be distributed via two modalities, indirect finance through intermediaries or direct investment

Generally public finance like the climate fund can be distributed through two modalities of financial flow, direct investment or through intermediary-like financial institutes including national funds and funds of funds (WB 1997). As for the accessibilities

of finance, for example, while loans can be provided either directly to the project or through intermediaries, guarantees will usually be provided through intermediaries including private financial institutes, local governments or lease companies. There are different patterns of funding structures as shown in Fig. 6.

Financial support through financial intermediaries such as national funds to small local projects by SMEs can help address barriers to scale up renewable energy investments. These intermediaries have close relationships with key stakeholders such as private companies, project developers and local banks and private investors. Thus, it is easy to identify potential clients and their track records.

Figure 6. Different financial flows and modalities – direct investment and intermediaries



4.3. National plans and visions to promise long term support are also needed to promote countries’ low-carbon programs

Eventually the constraints on scaling up RE/EE do not come from a lack of investment opportunities, but from overly cautious lending or unstable policy decision making. Therefore, designing financial feasible instruments and long-term financing policy

mechanisms can positively impact a country’s economy and environment.

That is, long-term policy indications can also support the creation of long-term financial scheme. A national policy that includes subsidies and tax exemptions for a specific investment and labelling systems on low-carbon products by developing information and distribution systems is required to

attract investors. On the other hand, carbon taxes and feed-in tariffs can change the value and the balance of companies' assets and liabilities in order to ensure a supply of stable support from the government and the long-term commitments of a support for low carbon investment (Brown and Jacobs, 2011). These factors can be an indicator of long-term visions of investment strategies in low-carbon technologies.

4.4. National fund schemes as direct access can enhance autonomy and capacity of financial management and development strategies of developing countries

Modalities of financial options should be differently designed to match the targets and needs of national climate change policy as well as the capacity and feasibilities of the country, since emission patterns differ among countries and the focus areas of mitigation activities are also different.

Various financing options can be designed as funding schemes for low-carbon projects using various tools.

As one option, a national fund is an autonomous trust fund model, called as a direct access model in this paper, in which domestic banks, such as the national development bank and national commercial bank in a developing country, obtain financial support from bilateral and multilateral organisations as well as from the national budget, and manage the funds. In such a case, the money is allocated directly to projects or to regional/local funds. Feasible financial structures and designs can be examined using case studies.

The three differently designed case studies that use national funds to be examined are as follow: 1) a performance-based approach system and investments 2) a revolving fund system and an intermediary function of local banks; and 3) a phase approach system with an effective international fund program. Lessons can be learnt from the three options with different financial modalities by examining the financial scheme, funding opportunities, MRV system, and its associated constraints and benefits as shown in Table 1.

Table1. Differently designed financing mechanism of National Fund

		1) Performance-based approach system	2) Revolving fund system	3) Phase approach system
Finance	Initial phase	Grants	Credit line (Interest rate; less than 4%)	Concessional loan (interest rate: subsidies)
	Second phase	The same as above	Loan	Loan
Capacity building/ technical assistance		High capacity and skills in financial management and MRV are needed	Technical assistance was provided in design of the fund/capacity in financial management and track record is needed	Capacity building program is provided both to local financial institutes and project developers
MRV		High (reward type)	Relatively high	No specifically required
Scale		Large	Small	Medium
Operational cost		Relatively low (compared with international standard)	Low (with financial support)	Low (with financial support)
Financial sources		Donation/ Norway fun, Revenue from a tax, etc	Revenue from a tax	UNEP funding
Example		Amazon fund	Thailand revolving fund	Tunisian Solar Water Heating loan facility

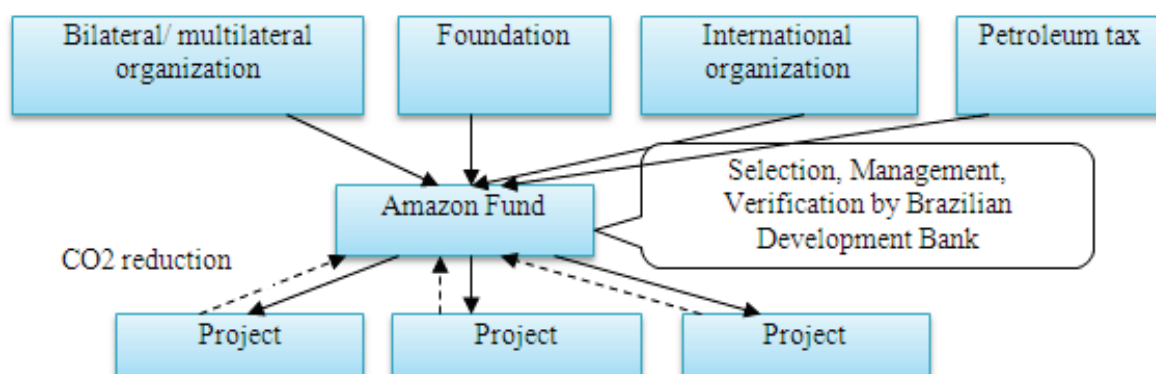
4.4.1. Option 1: Performance-based approach and investments: independent management of funds by a national bank

For instance, the Amazon fund that was designed and established as a national climate funding entity aiming at reducing the rate of deforestation in Brazil is managed by the Brazilian National Development Bank (BNDES), not by MDBs such as the World Bank (Fig.7). In the Amazon fund model, the bank provides the intermediation between performance-based financing (per tonne of carbon emissions avoided) and project investing. The Amazon fund has a unique finance structure with regard to three points: 1) performance-based financing; 2) restricted multi-stakeholder governance; 3) low-cost local management by the national development bank (Zadek 2009). In its performance-based approach, funding from the fund is provided to local project developers or programmes as a reward for reducing deforestation levels against a baseline. The mechanism works for projects mitigating the rate of deforestation in the rich Amazon forest. Projects obtain additional funding based on its performance and achievements in reducing the deforestation rate. Management and

monitoring are crucial in obtaining continuous funding from different organisations. In terms of cost-effective operations, 3% of donations cover management costs, a rate lower than international development banks such as the World Bank or Asian Development Bank, at which 10-15% of funds typically go to administration costs (Zadek 2010).

The Amazon fund model can further develop its design by applying different methods and structures. However, this model works only when the domestic bank has enough capacity and experiences to manage and allocate finances from difference sources. In Latin America, the capacity of banks is greater than that in other developing countries, reflecting the region’s long history of capacity building schemes in the financial sector. After the Rio Declaration on Environment and Development in 1992, the capacity of local financing institutes in Latin America developed in light of the importance of local financial management in enhancing conservation activities with innovative financing mechanisms such as Payment for Ecosystem. It took almost 10 years to establish such a reliable and stable banking system at both the national and sub-national levels (CFA 2008).

Figure 7. Financial structure of Amazon Fund

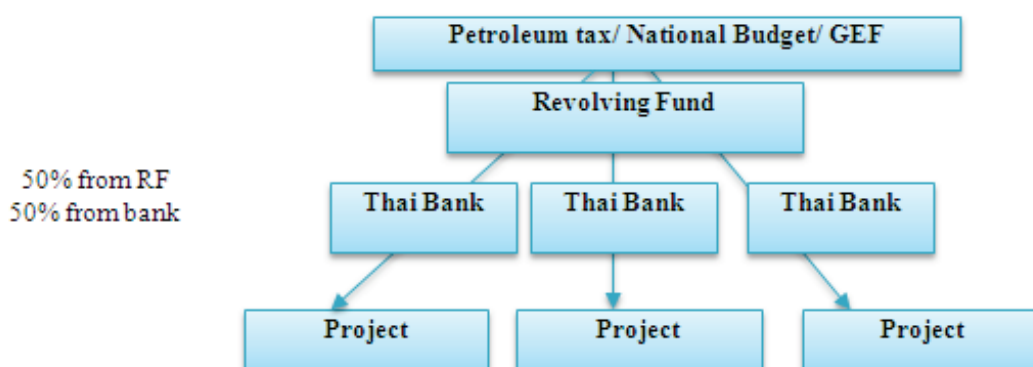


4.4.2. Option 2: Revolving fund system and intermediary function of local banks which build up local capacity to manage financing flows within a country

Public financing should not be one-time financing like ODA grants. Revolving types of finance can build the assets for developing countries to generate their own revenue streams to finance low-carbon projects. The Thailand Energy Efficiency Revolving Fund (REERF), for instance, receives government revenues or is raised from a dedicated tax. The fund

is provided to Thai banks through credit lines on a full-recourse basis and at a zero interest rate (Fig.8). Credit line services can then be provided to EE projects at interest rates of less than 4% through local banks (APEC 2005). The Fund initially provided up to 50 percent of on-lent capital, with the Thai banks covering the remainder through their own resources. The credit line programme gradually phases out the grant elements of payments. Thus the return from the project can be paid back to the bank, and the fund can continuously expand support for other potential projects.

Figure 8. Financing structure of Thailand Energy Efficiency Revolving Fund (REERF)



4.4.3. Common findings and barriers in national fund scheme

While both Brazil and Thailand have ownership to be able to select and approve funding projects with minimum operational costs, financial support to the projects can be limited. Due to performance-based investment scheme, the Brazilian Amazon Fund faced difficulties in shortening the approval time, and delivery has been delayed. A project can be carefully assessed and examined against a strict baseline to obtain approval. On the other hand, the Thailand revolving fund is small in size and the risks are allocated to the banks, as the program is designed

with the risks being wholly allocated to the banks (APEC 2005, APEC 2010). Consequently, in both cases, they tend to approve projects proposed by large or existing clients with good risk profiles and sufficient track records.

In order to overcome these barriers, a financial mechanism supported by international funds adopting a phase approach is needed. The following is a case study of a financing structure with financial support combined with a capacity building program, which aims to develop local capacity using different kinds of support in doing so.

4.4.4. Option 3: Phase approach system with an effective international fund program which can enhance low-carbon investment and shift investment patterns over the short term by supporting the lending of a domestic financial institute

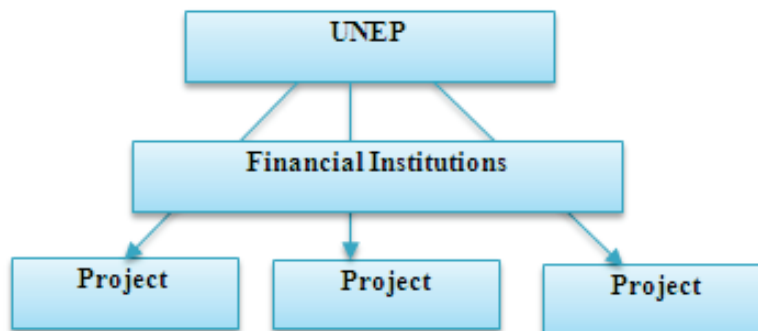
UNEP offers a program to reduce market barriers through financial incentives and a capacity building program to local banks who lend investors or project developers investment costs in the low-carbon energy sector. UNEP, having partnerships with local banks and financial institutions, has established local lending investment facilities to provide interest rate subsidies, loan guarantees and technical assistance to local banks (UNEP 2006, UNEP 2008).

The Tunisian Solar Water Heating loan facility, for instance, creates credit facilities using a channel for recovering the monthly loan payments and helps local banks which build loan portfolios in the renewable energy sector and provide an interest rate subsidy to potential customers (Fig.9). Usually

problems in implementing a project occur in the initial phase of the project, with high requirements for capacity building and financial support. Upfront costs include the capacity building of local financial institutions to manage funds and effectively operate the banking system, capacity building of project developers to implement and operate the technology, and the initial costs of construction and installation of facilities and technologies. The financial scheme can be structured to break down market barriers in the initial phase of the project to promote the commercialisation and deployment of low-carbon projects.

One impact of the program has been that the increasing trend towards clean energy and experiences has made an impression on policy-makers, who have come to recognise that clean tech can play a significant role in the country’s energy mix, a realisation which in turn can convince them of the need to shift to a low carbon policy.

Figure 9. Financing structure of Tunisian Solar Water Heating loan facility



4.5. Suggested fund design

4.5.1. A national financing scheme and direct access can build up financial management capacity in a country

Depending on the expected impacts from financial support, targeted technologies, and national policy and regulation, various financial schemes can be designed in more effective ways. In India, for example, where nearly 13 million SMEs comprise

more than 80% of all enterprises, the establishment of a national development bank for small industries helped reduce the transaction costs associated with lending loans and administration fees and provided SMEs training programs by clustering registered SMEs (IEA 2011). As such, by involving local intermediaries such as local banks in a financial scheme, a domestic fund can also be distributed in a country with autonomy in selecting projects appropriate in terms of national priorities and

national climate change strategies. These intermediaries can be useful to disseminate small scale RE/EE projects at low cost and to expand it to large-scale market.

4.5.2. International funds can provide support to meet short-term financial needs and the needs for capacity building in long term

International funds such as the Climate Technology Fund (CTF) and the UNEP financing program play a crucial role in supporting these national financial schemes. The funds are provided not as direct support to a project, but through local intermediaries. In order for a national/local financial institute to shift its lending pattern to low-carbon investment, it takes time due to the long process of establishing credit funding facilities and mechanisms using compiled track records while conducting risks assessment of borrowers. Concessional financing and technical assistance can be provided on a short term basis and help strengthen the capacity of financial management and reduce exposure to risks. These financial schemes are useful especially in responding to the needs of the expansion and deployment of a technology over the short term or in implementing large-scale projects.

4.5.3. RE/EE projects can increase the monetary value of environmental, economic and social benefits

Benefits arising through RE/EE include not only reductions in electricity costs and reductions in emissions over the long term, but also environmental, economic and social benefits and benefits in preventing primary risks to health, disaster or future regulatory interventions, and moreover reductions of total expenses for education and public awareness campaigns over the longer term. These benefits are usually not taken into account in the calculation of the total costs of RE/EE projects. If these elements are included in the cost-benefit analysis of RE/EE technologies, the balance between investment costs and benefits will change.

Usually, a low-carbon project cannot be expected when it exceeds the threshold of the cost-benefit ratio (Blyth and Savage 2011). Therefore, a financial mechanism to add value for low carbon projects and investments with similar mechanisms such as the Clean Development Mechanism (CDM) and voluntary carbon credits are needed. Although CDM projects issue credits in line with the GHG reduction amount and do not account for social and environmental benefits subsequent to operations, lessons can be learnt from the structure of the CDM mechanism, which improves the future expected cash flow of a project and the internal rate of return (IRR) of a low-carbon project typically with a low financial return, but expected potential GHG mitigation value. This is an example of a performance-based approach that assesses performance by the amount of greenhouse gases mitigated and provides rewards accordingly. Investment decisions in some CDM or voluntary carbon credit project are determined by estimating the costs and benefits by replacing conventional technology in the project documenting phase.

New financial mechanisms can evaluate environmental, economic and social benefits as well as GHG mitigation benefits and give monetary value to these benefits. These benefits can be those of indicators to encourage investment in a project which yields a lower investment return but higher social benefits. The mechanism can be funded by national funds with private finance who are looking for corporate social responsibility (CSR) as well as national and international support.

4.5.4. Creating the measurement, reporting, and verification (MRV) method of national funds is a key factor for the success of domestic financial schemes

In addition to these schemes, it is important to create measurement, reporting, and verification systems (MRV) to monitor the performance of low-carbon investments using a system such as micro-finance institutions (MFI) in which local extension staff visit each lender to collect money, monitor business

performance and provide advice. The experiences and monitoring patterns can be adopted in performance-based low carbon investment schemes for the implementation of low carbon technologies by SMEs.

5. Conclusion

Various advantages from low-carbon technologies such as RE/EE technology implementation can meet the needs and interests of various actors. Therefore by estimating all the potential economic, social and environmental benefits, the costs of RE/EE technology installation should be allocated in line with the interests of each beneficiary and party. For example, national and sub-national governments whose interests lie in mitigation of adverse impacts upon social health as well as CO₂ reductions and environmental protection may allocate their budgets to low-carbon projects to mitigate or prevent these adverse affects. Identification is needed to examine who will cover the incremental costs of new technology installation, who will back up the risks in a project, who will provide the capacity building program, how the project can generate its own revenue, and what policies should be applied.

These risk management tools should be carefully designed to attract the market while avoiding market distortions. The careful consideration of strategy is needed to ensure consistent cash flow to RE/EE projects when public financial support is withdrawn. Technical assistance will be a key factor in managing sustainable financial flows by building banks' capacity to lend and also to promote RE/EE project opportunities. For example, if market liquidity is a problem for an RE/EE business, options might include improving the condition of the RE/EE projects; extending the loan tenor to improve the asset-liability ratio; providing technical assistance to improve risk management etc.

While various funds can be created, they should be designed with clear objectives and long-term perspectives. Furthermore, not only effective national financial schemes, but also national policies reflecting long-term governmental commitments to

low-carbon development and RE/EE technology are essential for the dissemination of low-carbon technologies and their application at the local level.

6. Recommendation

The findings of the study and the suggested structure of funding modalities are to initiate a national fund scheme with direct access and multi-level financing with a combination of phased and performance-based approaches with modalities as the following;

Combination of phased and performance-based approaches

In the first year, national and international support, including grants, is provided for capacity building of local financial institutes, investors and SMEs as well as for monitoring and reporting systems taken as a long-term program. In the second phase, the financing scheme will transition to a performance-based reward system. The rewards are provided as soft loan lending by local investors or SMEs.

Innovative and potential financial schemes to deploy low-carbon technologies and projects on the ground at the local level should be operated through national schemes like national funds with international support for capacity building and technical assistance, and a distribution channel of either direct funding from a national fund or through intermediaries such as local banks (the details shown in the box below).

Long-term national financing schemes

In terms of long-term feasibility of funding to low carbon investment in a developing country, once a robust operational and management system is developed in a national fund scheme, it is possible for a developing country to expand own funding management mechanism as a sustainable financing scheme. National financial and political arrangements should be enhanced and implemented on the ground. International financial support can be also provided for long-term capacity building, along with technical and knowledge-related assistance in

accordance with the recipient country's development status. In terms of the governance and institutional arrangements for a financing scheme, the establishment of a national climate change fund with specific objectives is advantageous, with funds managed by national/local banks and distributed to local banks to support SMEs to initiate and operate RE/EE projects. Such support can be provided as cooperative management programs in which international financial institutes work with local financial institutes during the initial phase.

Monitoring, reporting and verification systems

However, to make the scheme feasible, long-term capacity building of national/local banks and the establishment of a measurement, reporting, and verification (MRV) system for the funds by a third party are essential. The MRV system can establish a similar structure with the microfinance institutes (MFI) which have provided funds to small enterprises or individuals, and establish a monitoring, tracking system and verifying business operations relevant to the investments by local institutions, and provide program and advisory support to enhance the capacity of local businesses.

BOX:

Financial modalities

- ***Funding instruments:*** International funding should include various methods including grants, loan and risk guarantee support, which differ depending on the objectives of the funding. It should be provided via grants, with of the remainder of the initial costs to be covered by concessional loans.
- ***Financial input:*** To ensure the continuity of funding sources, the funding sources should be sustainable by using revolving fund schemes having national tax revenue, such as the petroleum tax explained in the case of the Thailand Revolving Fund in Appendix 2.

Operational modalities

- ***Performance-based approach:*** Monitoring and verification of the fund are important. Thus, a performance-based approach incorporating long-term strategies is needed.
- ***Phase approach:*** As the market develops with a strengthening of local capacity for financial management, the situation in market conditions will shift. Therefore, a phased approach in the funding scheme, along with a long-term investment plan and the strong commitment of the national government, is needed. At first, the fund should be provided with grants utilising partnerships with international organisations to build up national financial management capacity. Meanwhile, the capacity of local financial institutes should be built up in order to manage local funds and familiarise them with the funding of RE/EE projects. Concurrently with this, loans should be provided in order to scale up projects. Technical assistance will be a key factor in managing sustainable financial flows by building the capacity of local banks to lend and also to promote RE/EE projects.

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APPENDIX

Appendix 1: Financial tools and options

1) Grants to cover initial and upfront costs and to provide technical assistance

This is a tool for the government or international development banks and organisations to provide grants for project development. It supports project developers in increasing their financial capital for projects. The grants can be used for technical assistance, capacity building or for assistance with upfront costs.

Tools	Pros	Cons
Project Development Grants	<ul style="list-style-type: none"> ✓ Assist project preparation activities, particularly with small developers who lack project development capital. ✓ It is provided as contingent grant basis which that support preparatory activities to be repaid in part or in full when the project has reached a revenue generating stage ✓ e.g. Confo Project Preparation Matching Funds, The Canadian Green Municipal Funds, etc 	<ul style="list-style-type: none"> ✓ Contingent grants bring a lack of business discipline and creating disincentive for success by forgiving the funding in the event of failure
Grants for Technical Assistance	<ul style="list-style-type: none"> ✓ Grant financed technical assistance programs. By building the capacities of market actors, technical assistance programs ensure systematic project development to generate a pipeline of investment ready and creditworthy projects, therefore, have potential to generate high leverage of commercial financing in the medium to long term 	<ul style="list-style-type: none"> ✓ Limited sources are available. The volume tends to be reduced in line with the reduction of ODA fund

Sources: UNEP 2008, UNEP2009, Stadelmann et al. 2011b, AGF 2009

2) Loan elements to enhance the lending capacity of local financial institutions

These finances can be provided through public or private financial institutions. International funds or funding organisations provide financial support through intermediaries such as local banks, which distribute the money and have experience in financial record-keeping and relationships with project developers and SMEs.

Tools	Pros	Cons
Credit line	<ul style="list-style-type: none"> ✓ Debt facilities provided to commercial financial institutions like local banks for on-lending, and usually on a full-recourse basis (for senior debt). ✓ Additional lending from local bank can be expected to induce borrowing and direct credit to target sectors and projects. ✓ i.g. Thailand Energy Efficiency Revolving Fund 	<ul style="list-style-type: none"> ✓ Compared to other public financing scheme, it is resource intensive. Technical assistance is generally required
Soft loan	<ul style="list-style-type: none"> ✓ Provide debt capital at concessional interest rates ✓ Soft loan programs allow deferred repayment until such time that the ventures reach the operation and revenue-generating stages ✓ e.g. The Green Municipal Investment Fund, etc 	<ul style="list-style-type: none"> ✓ Soft loans are usually provided by governments to projects. The selection of project was made by the government. ✓ Although the World Bank and other development institutions provide, the resources are limited by the project
Loan Softening Programmes	<ul style="list-style-type: none"> ✓ It is similar to soft loan programmes but only provides an incentive such as interest subsidy or partial guarantee or combination of both ✓ The benefit of the support is expected to be passed on to the borrowers from commercial financial institutes in the form of lower interest rates, lower front end deposits and extended loan repayment periods ✓ e.g. Tunisian Prosol Solar Water Heating Loan Program etc 	<ul style="list-style-type: none"> ✓ It does not support financing itself

Sources: UNEP 2008, UNEP2009, Stadelmann et al. 2011b, AGF 2009

3) Risk guarantees to reduce incremental costs and mitigate risks

This instrument can be covered by international development banks such as the World Bank. It is provided to financial institutions which invest in private companies, etc. Usually these risk guarantee schemes are operated through contracts with host governments (WB 1997). Renewable energy and energy efficiency projects usually hold credit risks and short maturity. Thus, a risk guarantee facility has the potential to leverage a sizable amount of bank lending. Projects are financed with concessional interest rate loans and performance based loans, or subordinate debt and mezzanine or equity finance either through local financial institutions or direct finance from international organisations.

Tools	Pros	Cons
Guarantee	<ul style="list-style-type: none"> ✓ Loan guarantees allow governments and other public finance institutions to underwrite loans to projects to protect the private investor against default risks. ✓ The lender (private investor) with guarantee is better positioned to charge a lower interest rate on the loan, thereby lowering its cost of capital and increasing its profitability ✓ e.g. Partial Risk Guarantees (PRGs) in IBRD and IDA 	<ul style="list-style-type: none"> ✓ Overly bureaucratic and lengthy process for obtaining a guarantee ✓ Lack of continuity in client relationship as well as perceived indecisiveness about whether a project could be covered (PRGs) ✓ It is adequate in medium to long-term liquidity, and appropriate in markets where borrowing cost are at reasonable level
Insurance	<ul style="list-style-type: none"> ✓ Public finance can be used to insure investors against the risk of policy uncertainty. ✓ The system is similar with conventional insurance bought by the public finance institution to cover the risk of policy change. ✓ To cover the incremental cost of investment caused by the policy changes, but has enabled the financing for the entire project. ✓ e.g. Political Risk Insurance (PRI) in MIGA, Overseas Private Investment Corporation (OPIC) etc 	<ul style="list-style-type: none"> ✓ To provide insurance only for debt that has an equity link (MIGA). ✓ The same as guarantees

Sources: UNEP 2008, UNEP2009, Stadelmann et al. 2011b, AGF 2009

4) Market risk hedge facilities to prevent market loss and other market risks

These tools are provided via private international institutions or public finance to reduce incremental costs and prevent the risk of market fluctuation and other market risks.

Tools	Pros	Cons
Foreign exchange fund	<ul style="list-style-type: none"> ✓ Establish currency funds which offer foreign exchange hedging products. ✓ Supply and purchase agreement or financial instruments such as interest rate or currency hedge can help to mitigate risks embedded in foreign exchange. ✓ e.g. Dutch Ministry of Foreign Affairs etc 	<ul style="list-style-type: none"> ✓ This tool may encourage high carbon investments unless specifying the applicable area because it can reduce investment risks in all sectors, not only for low-carbon investments.
Equity fund/ Subordinate fund	<ul style="list-style-type: none"> ✓ Public finance taking equity stakes cover up 'first-loss' equity position in funds before the private sector investors lose money ✓ An equity capital pledge fund can apply for small projects which cannot access sufficient equity in spite of the high interest rate of return (IRR) like CDM. ✓ e.g. ADB Clean Energy Private Equity Investment Funds etc 	<ul style="list-style-type: none"> ✓ This is only applicable for a project having a strong internal rate of return. ✓ It can remove too much risk from the private sector, which can blur the incentives for investors

Sources: UNEP 2008, UNEP2009, Stadelmann et al. 2011b, AGF 2009

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