

UNFCCC

INNOVATIVE OPTIONS FOR FINANCING THE DEVELOPMENT AND TRANSFER OF TECHNOLOGIES





INNOVATIVE OPTIONS FOR FINANCING

THE DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

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I.

FOREWORD

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The development, deployment, and diffusion, including transfer, of environmentally sound technologies to developing countries to significantly reduce the emission of greenhouse gases requires vast amounts of investment. Since the required amounts of investment are much more than the funds currently available from public sources, it is necessary to attract funding from other sources by creating innovative financing approaches that make it possible for a limited amount of public funds to attract significant amounts of funding from private sources.

Initiated by its work on enabling environments, the Expert Group on Technology Transfer (EGTT) discussed barriers to enhancing financing for technology transfer to developing countries. These barriers, in combination with the scale of the investment needs, prompted the EGTT in 2004 to initiate discussions among Parties, intergovernmental and non-governmental organizations on the issue of innovative financing for the development and transfer of technologies in the context of the UNFCCC.

Since then a number of activities have been organized aimed at engaging the private sector in the development and transfer of technologies to developing countries, including two workshops, a technical paper on innovative options for financing the development and transfer of technologies, and the publication of a guidebook on preparing technology transfer projects for financing. The EGTT also cooperates with the Climate Technology Initiative, to initiate a Private Financing Advisory Network, to provide technical assistance to project developers in developing countries in preparing project financing proposals to facilitate access to financing. The work of the EGTT in the area of innovative financing has benefited from the cooperation and support of current and former EGTT members, in particular Elmer Holt, Margaret E. Martin and Thomas Verheye.

This brochure is based on the technical paper on innovative options for financing the development and transfer of technologies and aims to make this information available to a wider audience. The publication of this brochure would not have been possible without the support of current EGTT members.

II. EXECUTIVE SUMMARY

The UNFCCC fosters a number of activities and opportunities to facilitate innovative financing for climate change technology transfer related to mitigation and adaptation. First, the Convention supports technology needs assessments, creation of enabling environments, and capacity building, all of which can be used to set the stage for innovative financing. Second, the Global Environment Facility and the clean development mechanism make funds available for climate change projects, and also stimulate public and private investors to finance climate change projects. Further, a number of public financial institutions have already begun to support climate change projects, including various multilateral and bilateral development banks, the United Nations Development Programme and the United Nations Environment Programme.

However the funds available from these sources are much less than the investments needed in developing countries to significantly reduce their greenhouse gas emissions and help them adapt to climate change. Thus it is essential to attract private financing for climate change technology transfer.

In many cases, access to public and private financing can be improved by introducing financing considerations early in the project development cycle and encouraging dialogue and cooperation at an early stage between project developers and the financial community. Frequently it will be enough to create new combinations or adjustments of existing financial instruments, instead of trying to develop new financial instruments aimed specifically at climate change.

The available financial instruments form a financial continuum in which public-sector instruments are generally applicable in the initial development phases of the project development cycle, and private-sector instruments in the latter phases. The continuum begins with public-sector instruments such as pure grants and subsidies, followed by instruments that are a combination of public-sector and

private-sector instruments such as concessional loans, supplier credit, and guarantees, and ends with private-sector instruments such as pure commercial loans.

It is possible to improve access to public financing for climate change projects by linking these to other policy concerns such as energy security, poverty alleviation or the Millennium Development Goals. Private-sector financing can be improved directly by sharing the risks of climate change projects with private financiers, or indirectly by awareness campaigns, imposing requirements in the form of rules and requirements, or levying taxes and subsidies. Finally it is possible to improve financial access from public-private sources by linking climate change projects to the concept of sustainable development. For example, some financiers are interested in the 'triple bottom line' of *profits, people* and *planet*, and evaluate projects not just in terms of their financial returns, but also in terms of environmental and social benefits.

Regardless of the type of returns considered in evaluating a project, risk management is essential, because financiers need to balance risks and returns in all projects. There are a number of techniques and instruments available to reduce a project's risks or to allocate the burden of bearing these to the stakeholders in the best position to do so, for example, commercial and political risk insurance, guarantees and international arbitration.

The theoretical considerations mentioned above need to be matched by action on the ground. Implementation activities can be gradually scaled up while more experience is gained with risks. In parallel, the climate change community can seek access to new and innovative financing by actively involving other stakeholders.

III.

INTRODUCTION

As much as USD 40 billion per year of new investment between now and 2050, of which more than half in developing countries, will be needed to significantly reduce greenhouse gas (GHG) emissions and de-carbonize the power sector. Since these amounts are much more than the funds available from public sources, it is necessary to attract other sources of funding. Two things are needed for this to happen. First, governments must create a market-friendly, clear and predictable playing field for private investors. Second, innovative financing approaches that make it possible for a limited amount of public funds to attract significant amounts of private funds must be developed.

Despite considerable interest from private financiers in investing in climate change projects, actual investments so far are limited. To change this situation, there is a need to connect the various actors and interests in the climate change arena. The climate change community needs to understand what makes projects attractive to financiers, so that together they can find innovative ways to finance climate change projects.

IV.

ONGOING ACTIVITIES AND OPPORTUNITIES

Background activities under the Convention

The current technology transfer framework under the Convention covers five key themes, of which the following provide opportunities to attract financing for climate change technology transfer.

Technology needs assessments (TNAs). TNAs, which aim to identify priority technology needs of developing countries, could be used to identify corresponding policies and market signals that would attract financing for climate change technology transfer. Further, TNAs could provide information useful for private and public financiers who are interested in financing environmentally sound technologies.

Creating enabling environments. The transfer of climate change priority technologies by private and public sectors needs a conducive environment, which could be created as part of the ongoing activities under the Convention. This enabling environment should be 'long', 'loud' and 'legal'. Here long indicates that the rules and incentives should be stable and sustained for a long period, consistent with the financing horizons typical of climate change projects; 'loud' means that the policy priorities and plans should be clear and robust enough to attract developers and financiers; and legal indicates that there should be a regulatory framework that provides a clear legal basis for long-term, capital-intensive investments.

Building capacity. At the national level, adequate capacity is needed to operate the legal and regulatory framework. At sectoral and project levels, additional capacity is needed to help project developers in demonstrating to private financiers that the proposed projects are financially attractive. Further, promoters and project developers should be assisted in preparing highquality projects that meet rigorous financial criteria. It would also be useful to help financiers better appreciate the characteristics of climate change projects, so that there would be common ground between project developers and financiers.

Box 1: EGTT and Innovative Financing

The role of the Expert Group on Technology Transfer (EGTT) is to analyse and identify ways to facilitate and advance technology transfer activities under the Convention, and make recommendations to the Subsidiary Body for Scientific and Technological Advice. As part of its work on enabling environments the EGTT has discussed barriers to enhancing financing for technology transfer to developing countries. This prompted the EGTT in 2004 to initiate discussions among Parties, intergovernmental and non-governmental organizations on the issue of innovative financing for the development and transfer of technologies in the UNFCCC context.

The work of the EGTT in the area of innovative financing aims to improve access to financing from a wide variety of available sources, in order to realize the increasing number of technology transfer projects. The UNFCCC workshop on innovative options to finance the development and transfer of technologies held in Montreal in 2004 was the first forum at which the subject of innovative financing was discussed in the context of Article 4, paragraph 5, of the Convention and to engage private sector financiers. The workshop on innovative options for financing the results of the technology needs assessments (TNAs) held in Bonn in 2005 was the next step in this process, where projects identified from TNAs and other sources were presented to the financial community. Both workshops highlighted the need for tool kits and handbooks on innovative/non-innovative financing of technology transfer projects to improve project preparation and assessment. The EGTT, in collaboration with the secretariat, has developed a guidebook on preparing technology transfer projects for financing to satisfy this need.¹ This guidebook aims to assist project proponents in developing countries in preparing project proposals that will meet the standards of international finance providers.

While recognizing that no single formula or template exists for preparing a successful project proposal, the guidebook concentrates on common ingredients that most well prepared

proposals contain. Understanding and demonstrating a mastery of these common ingredients, combined with knowing the audience will greatly increase the chances of success. The guidebook explains these common ingredients using a question-and-answer framework:

- What is being proposed? – The core concept
- Where will the proposal be implemented? – The setting
- Who will champion the proposal and see it to completion, and who else must be involved? – The team
- How will the proposal be implemented? – Implementation plans
- Why is the proposal important and why should it be supported? – Expectations
- What if things do not go as planned? – Contingencies
- To Whom is the proposal addressed? – The audience

The EGTT cooperates with the Climate Technology Initiative to initiate a Private Financing Advisory Network to provide further technical assistance to project proponents in developing countries in the preparation of project financing proposals to facilitate access to financing.

Note: ¹ Workshop reports, technical paper and the guidebook are available at <<http://ttclear.unfccc.int>>.

Financing opportunities under the Convention

The UNFCCC has facilitated a number of investment instruments and opportunities targeted at technology transfer (FIGURE 1). The Global Environment Facility (GEF) and the clean development mechanism (CDM), have provided a number of opportunities for attracting financing for climate change projects. Further, the UNFCCC process has also contributed to the creation of an enabling environment for climate change technology transfer.

Global Environment Facility. The GEF aims to play a catalytic role in the development of markets related to climate change. It allocates and disburses about USD 250 million per year in grants for climate change projects. For the least developed countries, GEF provides financing from the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). GEF funds have been used to stimulate innovative financing mechanisms, such as risk mitigation schemes, loan guarantee programs and micro-finance.

Project-based mechanisms under the Kyoto Protocol.

The Kyoto Protocol has provided for innovative and flexible financing mechanisms, such as the CDM and Joint Implementation (JI). These mechanisms offer a legal framework and a marketplace for Parties that are required to reduce GHG emissions. The CDM makes it easier to attract financing for climate change projects, through sales of carbon emissions reductions (BOX 2).

Financing activities of other organizations

The interest of development finance institutions indicates that there is an opportunity for climate change technology transfer in emerging markets. An important aspect of their activities is that they attract private financiers to climate change projects.

Multilateral development bank initiatives. The World Bank Group has become a leading financier in carbon finance, as well as a market facilitator and catalyst. It has launched a series of carbon funds to demonstrate how to achieve cost-effective GHG reductions while contributing to sustainable development. The World Bank Investment Framework for Clean Energy and Development aims to

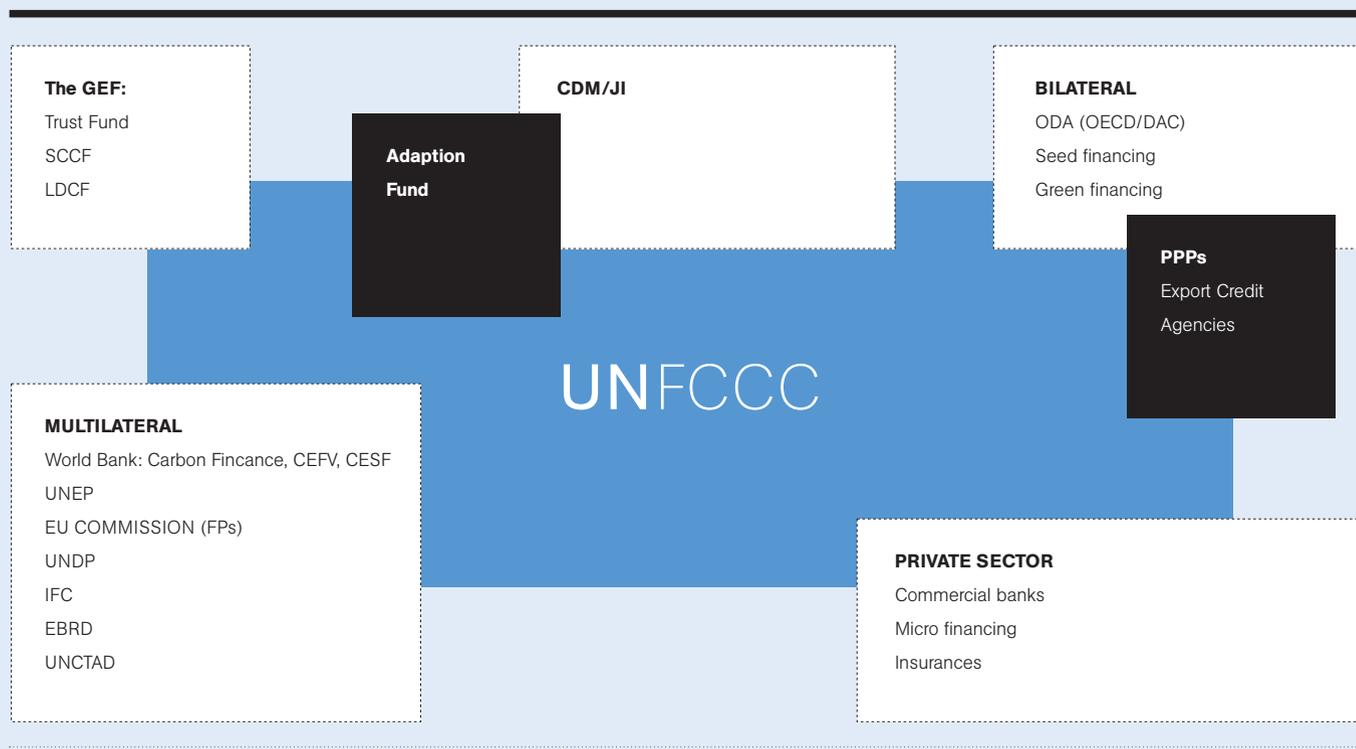
provide extensive support for mitigation and adaptation projects. The new financial instruments being considered are a clean energy financing vehicle (CEFV), which would blend public and private sources of financing to promote low carbon technologies, and a Clean Energy Support Fund (CESF), which would provide subsidies in line with the extent of carbon emission reductions.

Other Initiatives. The United Nations Development Programme (UNDP) is establishing its Millennium Development Goals (MDGs) Carbon Facility, a carbon-finance mechanism featuring emission offsets derived from projects that contribute directly to achieving the MDGs. Under this facility, UNDP will mobilize carbon finance and direct this towards developing a portfolio of projects that yield tangible sustainable development and poverty reduction benefits across a diverse group of developing countries.

The Finance Initiative of the United Nations Environment Programme (UNEP FI) is a global partnership between UNEP and over 160 financial institutions and a range of partner organizations to develop and promote linkages between the environment, sustainability and financial performance. UNEP FI focal areas include examination of different types of financial instruments/products and services that lead to climate change mitigation and adaptation, and renewable energy.

The Global Energy Efficiency and Renewable Energy Fund of the European Commission aims to blend capital of public and private investors, and support small- and medium-size projects and enterprises. The fund recognizes that private investors need higher financial returns and that public investors value the economic, social and environmental benefits of renewable energy investments more than most private investors.

The Private Financing Advisory Network is an initiative of the Climate Technology Initiative in cooperation with the EGTT to broaden the access to financing for technology transfer projects. Its goal is to get more renewable energy and climate friendly projects financed and thereby to accelerate technology transfer under the UNFCCC, by providing coaching and technical assistance to project proponents.

Figure 1: Funding targeted for climate change activities**Box 2: Pioneering CDM Project in Honduras**

The World Bank Group is a leading financier in carbon finance and manages a range of carbon funds, including the Community Development Carbon Fund (CDCF), which finances carbon projects in the poorer areas of the developing world. A historic milestone in the global carbon market was reached in October 2005 when La Esperanza, a Honduran enterprise, sold certified GHG emission-reductions to the CDCF for USD 1.395 million. La Esperanza is developing a 12.8 MW run-of-river hydroelectric project. La Esperanza's developers were supported initially by a specialized investment company with their business plan preparation and a USD 250,000 loan for construction of the first power house. In May 2003, a local Honduran private bank approved a term loan for the first phase (1.2 MW). In 2004, the Central American Bank for Economic Integration and Finnfund, the Finnish development bank, provided financing for the balance of the 12.8 MW generation capacity.

The case of La Esperanza highlights some of the factors that attract financing to climate change projects:

- Promoters involved professional financing specialists at an early stage;
- The pilot project was developed with a long-term view and with a framework similar to the project development cycle;
- A limited initial investment at appropriate terms formed the basis for the total financing package, postponing some major investment risks until at least some track record had been established;
- Non-financial benefits (environmental, social and economic) were included and quantified at an early stage;
- An enabling environment created by the Honduran authorities was in place; and
- Innovative funding was available from a pioneering carbon fund.

V. INNOVATIVE FINANCING

Innovative financing options are simply new combinations or adjustments of existing instruments and resources, rather than new financial instruments aimed exclusively at addressing climate change.

Introducing financing considerations in the project development cycle

In many cases, access to financing can often be improved by including explicit and clear financing considerations into the project development cycle (PDC) and by encouraging dialogue and cooperation at an early stage between policymakers, project developers and the financing sector.

Initial phases of the project cycle. The first phase of the PDC (TABLE 1) involves identification, at the strategic level, of sectors that offer promising opportunities, and an assessment of relevant policy issues such as the creation of an enabling environment for private investment. This is the time to assess which external and national programmes and institutions are interested in financing projects in these sectors, and to determine the nature and scope of projects that will attract these financiers.

The second phase of the PDC involves identification, at the sectoral level, of key sectoral issues. These include issues such as which sub-sectors offer investment opportunities, the role of the various stakeholders and the nature and value of cash flows that can be generated. This is the time to develop the fundamentals of the financing scheme, and bring together developers, financiers and other stakeholders so that the overall scope of the financing that can be attracted becomes clear.

The *pre-feasibility*, or third phase addresses the opportunities and limitations created in the two previous phases. Since an initial estimate of costs and revenues is now available, this is the time to involve financing experts in designing

the financing structure for the project. This is the time to incorporate risk design measures in the project, such as incorporating the lessons learned from other similar projects.

The *feasibility study*, the fourth phase of the PDC, involves integration of the various elements from the initial phases. The detailed estimates of costs, revenues and financing needs are used to define financing packages for interested financial institutions.

Later phases of the project cycle. In the *key decision* phase, the linkage with access to financing ensures that the elements introduced during earlier phases are included in the decision-making process. When both public and private financing are to be used, financial engineering is needed to secure the right balance between the two. The terms for private-sector financing should now be explored, and external advisors may need to be hired for an independent review of the financing options.

In the *pre-implementation* phase, preliminary rights can be granted for selected financiers to involve them in a legally binding way and to compare quotations or jointly develop the most adequate financing structure. The combined financial, economic, social and environmental benefits of a project can now be allocated to individual financiers and informal meetings arranged to better understand the opportunities on both sides.

The *implementation* phase may feature unforeseen adverse events such as large exchange rate changes or extreme weather conditions that may increase costs or reduce revenues. In turn, some financial engineering may be required to maintain the financial viability of the project.

Table 1: Financing issues in the project development cycle

Project development phase	Theme / issue involved	Financing issues
1. Overall strategy	Country level implementation plan, e.g.: <ul style="list-style-type: none"> • Extra power plant • Irrigation programme • Energy-efficiency programme 	<ul style="list-style-type: none"> • What is the legal and regulatory framework? • Which multilateral programmes apply? • How much lead-time is needed to change the current situation?
2. Sector strategy	<ul style="list-style-type: none"> • How much energy is needed in the planning period and who will be the purchasers? • Where can cross over to other sectors occur? 	<ul style="list-style-type: none"> • Which cash flows are generated and how can they be used for financing? • How can leverage for financiers (public and private) be increased? • Which multilateral sector programmes apply?
3. Pre-feasibility study (desk and field)	<ul style="list-style-type: none"> • Criteria for ranking projects • Do we build new (risky but modern) or retrofit existing ones (efficient but less effective)? 	<ul style="list-style-type: none"> • What is the risk profile of the potential projects from the financiers' point of view? • How can risk mitigating factors be built into the project design?
4. Feasibility study	<ul style="list-style-type: none"> • Ownership and capacity-building at the individual project level • Identify potential project partners • In-depth financial and technical analysis 	<ul style="list-style-type: none"> • Who is/are the stakeholders that can make-or-break the project, and how can they be involved? • Which public and private actors have a specific interest in project results with a link to financing opportunities?
5. Key decision	<ul style="list-style-type: none"> • Decision-parameters should include financing • (Pre-) select the contract-partners • Adequate financing based on explicit criteria should be a condition precedent to final decision 	<ul style="list-style-type: none"> • Financing process should be balanced with legal procedures: timing and interrelations • Government and other public actors can already take the lead in preparing the necessary rules to allocate adequate budgets
6. Pre-implementation	<ul style="list-style-type: none"> • Finalize financing in every aspect (contracting, disbursement procedures) • Arrange the internal competences to finance the project(s), e.g. cooperation with other (public) partners • Prepare the tender procedure 	<ul style="list-style-type: none"> • Explore which financing actors will eventually be prepared to join • Explicitly specify the financial, economic, social and environmental benefits • Allocate portions of the project to individual actors and check if appropriate
7. Implementation	<ul style="list-style-type: none"> • Ensure proper risk management • Develop alternatives for critical problems 	<ul style="list-style-type: none"> • Bring all financing into one basket • Manage the process of dividing the risks, returns and securities evenly among the financiers
8. Evaluation	<ul style="list-style-type: none"> • Compare results with prior objectives • Specify lessons learned • Decide on possible follow-up projects 	<ul style="list-style-type: none"> • Pre-arrange the terms of reference for follow-up projects • Loans repaid • Equity paid back with agreed financial return

Financing continuum: general financing instruments for technology transfer

The financing continuum shows the general financing instruments available for technology transfer, and their relevance at different stages of the PDC (FIGURE 2). In this continuum public-sector instruments are generally applicable in the initial development phases of the PDC and private-sector instruments in the latter phases. The continuum begins with public-sector instruments, followed by instruments that are a combination of public-sector and private-sector instruments, and ends with private-sector instruments.

Public-private partnerships (PPPs). Public and private financiers invest jointly in projects based on a common interest in promoting risky projects within a jointly agreed framework of goals, roles and risk-sharing. PPPs can be useful for large, complex projects, such as hydro power plants, and may be used along the entire financing continuum.

Public-sector instruments. There are a number of financing instruments in this category. To begin with, *subsidies and grants* can be used to attract private financing, for example, by subsidizing specific costs that prevent a project from becoming financially viable. Subsidies could also serve as an incentive to extend a project to specific target groups or to an area that is financially less attractive. *Government contracts and specialized programmes* are subsidies applicable when technology transfer fits into a wider set of public priorities. These programmes can build on the results of earlier subsidized programmes from the pioneering phase and focus on scaling up or replicating these results.

A *concessional loan*, sometimes also called *seed financing*, is used in the preparatory or pioneering phase of implementation, when the uncertainty of outcomes would make it difficult to access commercial financing. In some cases, these loans have innovative features, such as repayment required only if the project is successful. Seed capital, disbursed on the basis of clear milestones, can help the entrepreneur get started. Once there is a successful track record, the enterprise would find it easier to attract commercial finance.

Private sector instruments. The developer's contribution to the project capital, called *entrepreneur's equity*, is a key element of financing. Even if it is small, it shows the developer's commitment to the project.

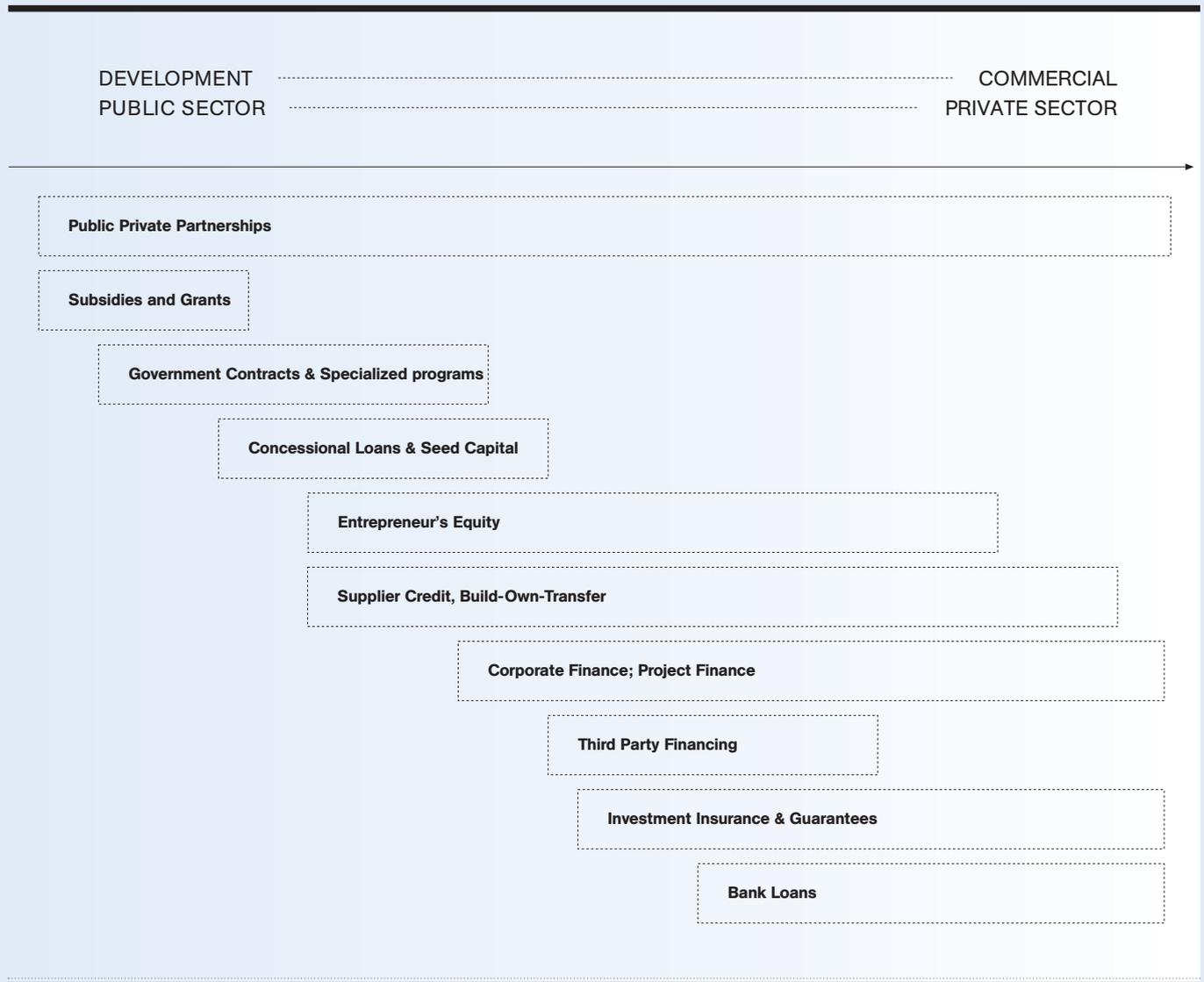
To promote the sale of their equipment, equipment suppliers often provide *credit* to buyers. These loans usually have to be repaid within a few months, so they are not important for projects with a long financial horizon. However, they can be helpful in situations where the buyer intends to resell the equipment quickly, for example, a solar home systems dealer who uses these credits to purchase system components and then sells the complete system to customers shortly thereafter.

Build-own-transfer (BOT) financing is applied mostly in large infrastructure projects, such as large power generation plants that are built and operated by private investors. Such projects are expected to generate cash flows large enough to provide an attractive rate of return to private investors. After a specific period, project ownership is transferred to the government.

The loans that companies take to finance their projects can be formulated in two ways: as *corporate finance* or *project finance*. For corporate finance loans, all the assets of the company, including shareholder capital, serve as collateral; the lender has the right to dip into all of the company's income and assets to recover the loan. In contrast, a project finance loan is secured only by the assets and revenues from the project; if the project fails to generate enough revenues, the financier has no right to the company's other assets or income to recover the loan.

In some cases, the equipment is financed by a *third party*, distinct from the equipment seller and project developer. The financier receives regular payments from the project developer, usually through a lease. This scheme is appropriate where cash flows are used to repay equipment leases for standard, proven equipment used in stable market environments.

Export credit agencies (ECAs) facilitate the financing of international transactions by offering *guarantees*, mostly to private parties, against specific political and commercial risks, typically in longer-lasting, large-scale projects where there is a need to guard against currency risks or political

Figure 2: The Financing Continuum

instability. Government influence can be used to induce ECAs to become active in technology transfer projects. Guarantees have a key role in situations where a high level of perceived risk deters private investors. If the risk turns out to be real, the guarantee compensates the financier; if the risk does not materialize, the money will not be spent. The guarantees are often partial, so that the risk is shared by the financier and the guarantor.

In most cases, *bank loans* are suitable for established companies and mature sectors, and standard loan instruments seldom form a crucial self-standing part of innovative financing solutions. However, standard loan instruments can be modified and blended with other financing instruments to become part of innovative financial packages.

VI. IMPROVING ACCESS TO FINANCING

This section will focus on how to improve access to public and private-sector financing by applying the mechanisms introduced earlier in this brochure. Various options will be suggested to link funding from the public and private sectors and new options to involve the international private sector will be discussed. Note that improving access to financing does not necessarily imply increasing the total available funding, but how best to access available funding.

Improving access to public-sector financing

It is possible to improve access to public-sector financing by linking climate change technology transfer projects to other policy areas (BOX 3). Widening the scope of a climate change project to include other policy areas has two benefits: it may make it possible to tap funds available for the other policy areas; and, if the other elements produce direct financial benefits, then the linkages increase the overall financial viability of the project and thus improve access to financing.

Improving access to private-sector financing

Private-sector financing for climate change technology transfer can be obtained from financial institutions, such as banks, foundations and investment companies, or industrial corporations, such as construction companies, suppliers and purchasers. Financial institutions are typically interested in specific climate change related sectors, such as energy, agriculture or water, which are clearly linked to their core business. Hence, at an early stage, it is important to discuss possibilities with multiple financial institutions; for larger projects, it may be useful to involve independent financing experts who can discuss the project in depth with potentially interested financiers. Industrial corporations often have clear guiding principles for their involvement in climate change technology transfer, and there usually needs to be a link to their business strategy, for example, to secure future business in power generation in the case of energy companies.

Access to private-sector financing can be improved directly by sharing the risks of climate change projects with private financiers, or indirectly by various mechanisms (BOX 4).

Improving access from public-private sources

The sustainable development concept offers the possibility of the development for a common set of criteria for the financing of climate change technology transfer. For example, in 2005, General Electric Company (GE) and the World Resources Institute (WRI) jointly published a call to develop clean energy worldwide, and GE and other corporations have joined with WRI to implement aggressive new plans to cut GHG emissions in their operations. Another example is the World Business Council for Sustainable Development, which is a coalition of 175 international companies united by the three pillars of economic growth, ecological balance and social progress. It aims to provide business leadership as a catalyst for change toward sustainable development, and to promote the role of eco-efficiency, innovation and corporate social responsibility.

The commitment by business leaders at the 2005 G8 meeting to ongoing and increased investments in low-carbon technologies is an example of the overlap between the private and public sectors. The G8 argued that what is needed is a strengthening of policy mechanisms, with an emphasis on the careful and focused use of market mechanisms.

Box 3: Improving access to public-sector financing

The following policy areas offer opportunities for linking climate change technology transfer projects to public sector funds:

Energy security

The recent increase in oil prices has made clearer the link between climate change and energy security. More funds can become available for renewable energy and energy efficiency – which are not susceptible to the same fluctuations as traditional fuels – when the energy supply from traditional resources appears uncertain. It follows that integrating the climate change theme with energy security can improve access to public funding.

Poverty alleviation: linkages to land utilization

Effective land use is a key requirement for improving rural incomes and reducing poverty levels. Land use change, when carried out with climate change in mind, can also contribute to mitigation. To the extent that the land use changes required for poverty alleviation coincide with those required for carbon sequestration, significant synergies could be created in meeting both objectives. Climate change related disasters can set back poverty alleviation efforts by disrupting social safety nets, along with damage to homes, businesses and community

infrastructure. These effects can be mitigated by disaster prediction and preventive adaptation measures. Additional financing to develop and implement these adaptation measures could be generated by emphasizing these linkages with overall poverty alleviation policies.

Other linkages with climate change:

- Clean energy for cooking and health. Considerable funding has become available for the promotion of clean energy for cooking because the Millennium Development Goals address indoor air pollution, which affects the health of women and children.
 - Income generation. For example, renewable energy sources such as solar power and hydropower can be made available in rural areas for productive use.
 - Regional cooperation activities, which may help to increase access to financing by creating a critical mass of projects. This type of linkage may be particularly important for small island developing States, where regional cooperation is often necessary to create economies of scale through larger regional markets.
-

Box 4: Improving access to private sector funding

The following mechanisms have proved successful in facilitating access to private funds:

Information campaigns

The public sector and non-governmental organizations can inform financial institutions and industrial corporations about the opportunities and robustness of environmentally sound technologies. This can make it easier for financiers to understand the opportunities and reduce perceived risks. One effort to reach out to financiers is the UNEP Sustainable Energy Finance Initiative, which brings together financiers, engages them to do jointly what they may have been reluctant to do individually, and coaxes them to enter into public–private alliances in the sustainable energy finance area.

Market development instruments

Risk mitigation instruments provided by public-sector or multilateral programmes can help convince financiers who are otherwise unwilling to invest in a nascent market. These instruments would have to be tailored to climate change technology transfer, based on an assessment of the nature of support needed by private financiers. For example, for small-scale renewable energy technologies that are already commercialized but constrained by a lack of end-user financing, UNEP has been implementing ‘credit enhancement’ programmes, such as guarantees or temporary interest subsidies, for local financial institutions.

Rules and requirements

Companies can be motivated by rules that give them a privileged position provided they meet the rules or requirements related to climate change. An example is power generation contracts that are open only to companies that meet the required percentage of renewable energy in their energy mix.

Taxes, levies and subsidies

Governments can use a ‘carrot and stick’ approach to reward or penalize companies through tax exemptions, tax holidays, or subsidies. Taxes and levies can be applied to polluting technologies or other business practices that contribute strongly to climate change or go against adaptation measures. The proceeds of these taxes and levies could be used for climate change related technology transfer. Tax benefits, such as accelerated depreciation of energy efficient or low-emission capital equipment, also provide an incentive for businesses to invest in climate change technology transfer. Governments could also provide tax incentives or subsidies to the private sector for the transfer of climate change priority technologies to developing countries. Export-Import bank guarantees could also encourage the private sector to transfer technology.

VII. MANAGING RISKS AND RETURNS

Risk management is a core element of attracting financing for a project. Financiers may require explicit risk reduction measures in the form of extra investment, as a pre-condition for their investment, and may require continuous monitoring and reporting, which also has a cost.

Risk management

Financiers are used to assessing risks associated with financing large-scale renewable energy projects in developing countries and have developed risk management instruments to mitigate these risks (TABLE 2). Similar risk mitigation instruments can be applied to technology transfer projects.

Climate change related technology transfer projects are often perceived to have additional risks beyond traditional financing risks. For example, financiers may be worried that the outcome of climate change technology transfer is uncertain because it is being implemented for the first time, where ‘first time’ can refer to the technology itself or to the technology being implemented for the first time in the country or region of interest. Other risks relate to the long time horizon of climate change projects. Actively managing these risks, such as by establishing a long, loud and legal enabling framework, can increase the likelihood of attracting private finance.

If there is close cooperation between stakeholders from an early stage, risk reduction actions can be allocated to the party responsible for the particular risk or to the party for whom the mitigation of the risk is most cost-effective. Risk management can also take place at the national level, in cases where the government provides the proper enabling environment or by supporting an adequate regulatory framework.

Financiers may be more comfortable with an approach where a pilot project is undertaken before scale-up, as this offers more opportunities to mitigate risks in the future from the lessons learned in the pilot. The financing continuum reflects this notion in the parallel between public/development

financing and private/commercial financing. The PDC can facilitate communication at an early stage between stakeholders and financiers to determine the scope of technology transfer after the pilot phase.

Bundling individual smaller projects into one larger project or into a series of projects also reduces risks and increases the opportunity to learn by doing. Bundling (or grouping) can refer to time (next project only after previous project is successful) or to geographic location (in more than one country).

Returns management

Since financiers, public and private, assess a project in terms of returns and risks, in order to make up for increased (perceived) risks, it is important to increase the potential returns of a project. Actions taken to increase returns are called returns management, and focus on this area is essential to improve access to financing. Apart from financial returns, project developers should also look at other types of return, including:

- *Economic returns*, which measure the jobs created or incomes generated directly or indirectly by the project;
- *Environmental returns*, such as mitigation of GHG emissions, or other emissions that have local benefits;
- *Social returns*, such as reducing illness (or the future risk thereof) or improving education.

In recent years, there has been an increased recognition that climate change mitigation and adaptation can generate returns on all four categories, directly or indirectly. The rise of ‘triple-bottom-line investing’ provides evidence of the growing interest of mainstream pension funds and banks in environmental issues. Under triple-bottom-line investing, in addition to the traditional *profit* indicator, consideration is also given to *people* and *planet* indicators to determine the attractiveness of the investments.

Working with the concept of returns in such an explicit manner is a new approach in accessing financing for the climate change area. Awareness of the many benefits of projects has always existed, but mostly in a general way. The truly innovative next step would be to make these benefits explicit and to quantify them so that they can be measured and monitored.

Table 2: Risks associated with large-scale renewable energy projects in developing countries

Risk	Nature of risk	Risk mitigation approach	
		Financial risk management Instruments	Other
1. PROJECT DEVELOPMENT/PRE-CONSTRUCTION PHASE			
Concept to implementation	<ul style="list-style-type: none"> Feasibility analysis indicates project not viable Regulatory clearances delayed/denied Financial closure not achieved 	<ul style="list-style-type: none"> (contingent) grants 	
2. CONSTRUCTION PHASE			
Construction/completion risk	<ul style="list-style-type: none"> Time and/or cost overrun Project does not meet technical specifications Changes to project assumptions make the project unviable 	<ul style="list-style-type: none"> Insurance – construction all risks (CAR/EAR) 	<ul style="list-style-type: none"> Construction through turnkey contract
Counterparty risk	<ul style="list-style-type: none"> Risk that the construction contractor does not perform as per contract 	<ul style="list-style-type: none"> Surety bonds – performance guarantees Liquidation damages 	<ul style="list-style-type: none"> Due diligence process
3. OPERATING PHASE			
Performance risk	<ul style="list-style-type: none"> Technical performance Managing the facility Damage to or theft of equipment 	<ul style="list-style-type: none"> Insurance 	<ul style="list-style-type: none"> Operation through O&M contract Product guarantee/warranty
Counterparty risk	<ul style="list-style-type: none"> Risk that the O&M contractor does not perform as per contract 	<ul style="list-style-type: none"> Surety bonds – performance guarantees Liquidation damages 	<ul style="list-style-type: none"> Due diligence process
Fuel supply risk	<ul style="list-style-type: none"> Intermittent/Irregular fuel supply 	<ul style="list-style-type: none"> Weather insurance/derivatives 	

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Risk	Nature of risk	Risk mitigation approach	
		Financial risk management Instruments	Other
Market risk	<ul style="list-style-type: none"> • Demand related • Price related 		
Credit risk	<ul style="list-style-type: none"> • Related to default by purchaser i.e. inability of the purchaser/utility running to meet their payment obligations 	<ul style="list-style-type: none"> • Guarantees • Credit derivatives 	<ul style="list-style-type: none"> • Sovereign guarantee

4. GENERIC – ALL PHASES

Financial risk	<ul style="list-style-type: none"> • Fluctuations in interest rate, currency exchange rate, etc. 	<ul style="list-style-type: none"> • Standard derivative products 	
Legal	<ul style="list-style-type: none"> • Contract enforcement 		<ul style="list-style-type: none"> • Sovereign guarantee • International arbitration
Regulatory	<ul style="list-style-type: none"> • Lack of long-term view/plan on renewable energy • Regulatory uncertainties – changes in approach to determining the feed-in tariff 		<ul style="list-style-type: none"> • Assurance statements from regulator on approach/policy directions
Political risk	<ul style="list-style-type: none"> • Currency inconvertibility • Expropriation • Political violence • Breach of contract 	<ul style="list-style-type: none"> • Political risk insurance • Multilateral Financial Institution guarantees • Export credit guarantees 	
Force majeure risk	<ul style="list-style-type: none"> • Natural catastrophe • Human-made interruptions 	<ul style="list-style-type: none"> • Insurance • Catastrophe bonds 	

Source: UNEP, 2006. Assessment of financial risk management instruments for renewable energy projects in Developing Countries.

VIII. NEXT STEPS

This brochure has discussed a variety of innovative financing options to improve access to financing for climate change related technology transfer. Further exploration of financing options is essential given that this is a rapidly changing area.

In order to increase the impact of technology transfer projects, it is important that the circle of actors is expanded and awareness raised. Communication and outreach on the lessons learned from innovative financing approaches to new stakeholders, financiers, project developers and policy makers are necessary in order to increase awareness and improve access to financing.

The theoretical considerations discussed in this brochure need to be matched by action on the ground. Implementation activities can be gradually scaled up while more experience is gained with risks. In parallel, the climate change community can seek access to new and innovative financing by actively involving other stakeholders. As stated during the 2005 UNFCCC workshop on innovative financing options, "Action is the innovation".



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