

***Innovative Options for
Financing the Development and Transfer of Technologies
in the framework of the United Nations Framework
Convention on Climate Change (UNFCCC)***

Background Information Paper

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Executive Summary

To financiers, the transfer of technologies often is associated with increased risk and substantial transaction costs, causing major hurdles for access to financing and leading to high costs of financing. The issue becomes even more challenging when considering that financiers tend to believe that financing risks in a politically driven context tend to be higher.

In the context of the United Nations Framework Convention on Climate Change (UNFCCC), financing the transfer of technology is increasingly becoming a crucial issue. Taking into consideration the overall decline of Official Development Assistance (ODA), limited resources available and competing priorities, it is necessary for Parties to explore additional effective means for financing technology transfer which could enable non-Annex I Parties to implement the Convention.

An innovative, creative approach of financing models and mechanisms therefore is crucial to create better access to financing for climate change related technologies and projects.

This requires a concerted effort of policy makers, financiers and developers of projects and technology. This paper intends to develop common ground for these stakeholders, by exploring the needs and opportunities of financing, and by indicating innovative approaches.

This paper first presents some key notions to look at the financing of technology transfer, which can be used as ingredients when creating particular financing menus. It concludes that many of these notions can be applied in the financing of development and transfer of technologies related to climate change, thus creating new opportunities.

A selection of financing instruments and models already applied in conventional technology transfer appears to offer additional financing opportunities when slightly altering the common climate change-approach. How this can be done (and has been) done is illustrated when a number of climate-change related financing models and mechanisms is presented. Finally a few case studies demonstrate how a combination of mechanisms can be applied.

In conclusion, four tools are being presented to improve access to financing for climate-change related technology-transfer:

- Look for added value for particular stakeholders;
- Specify and quantify as much as possible the benefits and revenues for stakeholders;
- Link the 'climate change'-theme to other themes to improve the economic or financial sustainability of a project;
- Effective policy-framework should be in place, meeting a number of requirements summarized as *loud* (adequate framework communicated properly), *long* (stable and sustainable to reflect financing horizons) and *legal* (legal establishment with binding targets).

The annexes contain a glossary of selected financing terms and climate-change vocabulary, as well as many references (with web-links) to the themes and examples used in this paper. These will provide hands-on assistance in applying the innovative options presented in this paper to access new financing resources for in new project proposals in the development and transfer of technologies in the context of the UNFCCC.

1 Scoping the Theme

The Subsidiary Body for Scientific and Technological Advice (SBSTA) at its nineteenth session endorsed the program of work of the Expert Group on Technology Transfer (EGTT) for 2004. The program of work for 2004 includes a new area of work denominated innovative financing.

The SBSTA, at the same session, requested the secretariat to organize a workshop on innovative options for financing the development and transfer of technologies, taking into consideration terms of reference recommended by the EGTT, and to report on the findings of the workshop to the SBSTA at its twenty-first session.

The workshop on innovative options for financing the development and transfer of technologies will be held from 27 - 29 September 2004 in Montreal, Canada. It will serve as the first forum at which the subject of innovative options for financing the development and transfer of technologies is discussed in the context of the implementation of Article 4.5 of the UNFCCC Convention.

The workshop intends to have a practical focus, utilizing to the greatest extent possible actual innovative financing situations and experiences.

This background information paper intends to serve as working document for this workshop and to serve as input to the discussion, taking into consideration that the aim of the workshop is, *inter alia*, to discuss and address the following elements and aspects of innovative financing:

- (a) Setting the scene and introduction of the issue of innovative financing for the development and transfer of technology
- (b) Presentations on case studies representative of a variety of players and stages of technology and market development;
- (c) Presentation of a range of financial mechanisms;
- (d) Application of innovative financing to identified technology needs in the context of the UNFCCC process;
- (e) Develop a set of recommendations for further consideration.

The expected outcome of the workshop is to:

- To create a better understanding among workshop participants representing Governments, Intergovernmental Organizations, Non-governmental organizations and the private sector on the subject of innovative financing in order to facilitate the development and transfer of environmentally sound technologies under the UNFCCC;
- To share experiences and information, on the basis of a number of case studies, on good practices in creating favorable financial conditions for the development and transfer of technologies and on innovative financing options that have been recently developed in different sectors, including mitigation and adaptation;
- To narrow the differences and generate innovative ideas for financing technology transfer activities under the Convention and to draw conclusions for further discussion by the EGTT and the SBSTA on possible next steps on this subject.

2 Financiers and Technology Transfer

2.1 Introduction to 'Financing'

The word 'Financing' has many meanings. In this paragraph some of these will be illustrated for the purpose of this document. At the root-level, financing indicates three notions:

- **Subsidies, grants, donations and, to a certain extent, contract-payments:** money which you do not need to repay and can be used for pre-agreed purposes.
- **Loans:** when a lender gives money to a borrower, and the borrower agrees to repay the borrowed money along with interest, at a predetermined date in the future.
- **Equity:** stock, or any security, representing an ownership interest, with the intention to create revenues by retaining profits or by selling the equity at a capital gain after a certain period of time.

Most other meanings of the word 'financing' describe either hybrid forms of these three basic notions or the various modes in which these can be applied. (Annex I contains a glossary of financing terms).

When applied in practice, many rules and regulations apply to the various sectors of financing. It is important to illustrate a few that can be relevant in the setting of this background paper, without elaborating on them:

- Corporate financing focuses on the assets and liabilities of the company and how its plans add value. Typically, corporate R&D-programs will be financed with equity or subsidies, as the value added is still uncertain). Commercially viable projects can largely be financed using senior debt (at a low interest rate), e.g. a private hydropower station.
- Small and Medium Enterprises (SMEs): The entrepreneur is the key for any financing. A business plan helps to translate the businessman's idea into a format for a financier.
- Utilities will usually be assessed on the long-term perspectives of their business, be it power generation ('power purchase agreements' and feed-in tariffs) or operating a road, bridge, harbor or airport. The legal and regulatory framework is a key factor in assessing their financing opportunities.
- Government programs will be able to attract funding from taxes and levies, from international donors or from (inter) national lenders. The stability of the political and economic system and the fit between the government's program and the financier's objectives determine the access to adequate financing.

In brief this indicates a few of the many possible appearances of 'money' and 'financing'. However, only a few key words rule the day-to-day business of a financier, and they are useful ingredients of a creative financing strategy:

- *Risk and Return:* Putting money into someone else's trust to achieve certain objectives creates a risk. The higher this risk, the higher the desired return for the financier. For loans and equity this is reflected in interest rates and profits. For subsidies etc. this is mainly reflected in the required match between the objectives of the financier and the recipient. Fund-raising (or accessing financing) is mostly a matter of agreeing on a Risk-Return Ratio by providing information in a transparent way, while structuring the project in an accountable way and by building credibility during this process.
- *Transparency* is a vital notion in financing. In essence it means translating ideas and plans into a format that provides easy and complete access to the key information for financiers during the assessment process and during the implementation. The higher the transparency, the better the understanding by the financier, the more balanced the Risk-Return-Ratio.
- *Accountability* refers to ownership of a project or program: accept responsibility for the results. Once a financier has made a commitment, it is all into the hands of the 'owner' of the project. Qualified entrepreneurs, managers, engineers, researchers or officers working with clear and fit-

for-purpose procedures. Result-oriented culture and adequate monitoring procedures are key requirements here.

- *Credibility* is what you gain by building a successful track record and applying the principles of transparency and accountability. It translates into easy access to financing.

In addition, but at a lower priority, there is the issue of ‘transaction costs’, which influences the financier’s appetite. Transaction costs are costs incurred by a financier when assessing or monitoring financial commitments (loans and equity but also subsidized programs). Typically these costs are relatively high for smaller projects. Although these costs may be considerable in large projects, there they only reflect a small portion and can therefore be justified more easily. In smaller projects these costs form an important obstacle, that sometimes can be removed by clustering projects or by increasing the project-period.

2.2 Financiers’ appetite of something new

Technology Transfer is described by the IPCC¹ as

*A broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions.*²

This description explicitly mentions processes as the core of technology transfer. As with all processes, they intend to lead to concrete goals such as energy saving projects, new technology or hydropower plants. The core of these processes, described as ‘flows of know-how, experience and equipment’, provides a practical tool to materialize this, which is what this paper intends to illustrate.

An important notion related to these ‘flows’ is the element of novelty, illustrated by the following observation:

Transferring technologies implies that something new is being undertaken: a technology is developed or applied in an area that it has not been applied before. Even replication in another context creates ‘first-time’ elements. The new element can be technological, policy or geographical or a new target group, new stakeholders, or a new component in an existing process.

This observation contains two elements that are crucial in accessing financing:

1. Something *new* means: ‘not been done before’ and may create additional risks in developing or applying the technology as well as leading to additional transaction costs. Identifying and mitigating these risks plays an important part in assessing the project. This holds true for private financing (interest rate may go up) and public financing (the new project needs to meet the policy criteria).
2. *New* partners or stakeholders may need to be involved in the process, e.g. with specific expertise a new region which takes time to organize and money (transaction costs) and creates additional risks. These partners can be from the finance-side or directly related to the technology-transfer.

Innovative or creative options in financing often are developed around these two risk issues: detailed risk assessment and allocation of these risks to partners.

A simple example of a mortgage may illustrate this:

¹ IPCC = Intergovernmental Panel on Climate Change. See Glossary of Climate Change Related Terms

² Source: IPCC Special Reports - Methodological and Technological Issues in Technology Transfer. See References

If someone buys a house, a mortgage is usually needed. It is common knowledge that the interest rate goes up with a high mortgage in relation to the value of the house and to the buyer's income, the latter forming the basic security for a financier. When the buyer is new to the region or if the income is uncertain, it may cost time and resources (transaction costs) to find a financier (the new party) that can be convinced that the income is secure and that the purchase price reflects the value of the property (risk assessment).

2.3 Mitigation and Adaptation as Labels for Financiers

The IPCC Third Assessment Report provides the following descriptions³ for adaptation and mitigation:

- *Adaptation*: Adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
- *Mitigation*: An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases.

‘Adaptation’ and ‘mitigation’ are important labels in the context of the UNFCCC. It is useful to explore these labels in this stage of the paper, to see if and how they influence the approach to innovative financing options.

Table 1 Overview of sub-sectors in Mitigation and Adaptation

Sub-sector	Mitigation	Adaptation
Energy	X	
Transport	X	
Waste Management	X	
Industry	X	
Forestry	X	X
Agriculture	X	X
Capacity Building	X	X
Coastal Zone Management		X
River Base management		X
Human Health		X
Natural Resources Management		X
Other Assessments		X

In practice ‘Adaptation’ mostly refers to large-scale measures predominantly in the public sector, often focusing on a very long term (twenty years and more), sometimes with major operational costs in addition to (physical) investments. ‘Mitigation’ measures often pertain to private or mixed (public-private) measures on a medium to large scale, frequently related to infrastructure projects. Mitigation-projects tend to have a strong opportunity to recuperate at least part of the cost via direct revenues. The revenue-generating capacity of Adaptation-programs traditionally is low, but even here specific taxes and user levies (toll for bridges) can be applied to create such income streams.

³ Source: Glossary; IPCC Third Assessment Report. See: www.ipcc.ch.

Table 2: Some General Financing Characteristics of ‘Mitigation’ and ‘Adaptation’

	<i>Adaptation</i>	<i>Mitigation</i>
Scale	Very large (as of USD 5 million but often over USD 50 million)	Medium (USD 1-5 million) – very large (over USD 50 million)
Term	> 20 yrs	5 – 25
Focus & revenue - basis	<ul style="list-style-type: none"> Costs, including R&D and capacity building and other expenses that may not lead directly to investment projects; Investments with no or little direct revenues, but sometime with opportunity for taxes and levies 	<ul style="list-style-type: none"> Costs to prepare for start project-related investments; Investments with some or good opportunities for revenues from transaction benefits (e.g. Energy feed-in tariffs, toll, cost reduction) or from public sources (levies and specific taxes).
Parties involved	Driven by public sector; private sector subcontracts or implements.	Traditionally publicly financed and increasingly a role and opportunity for private sector.
Financing	Mostly public ranging from grants from multilateral funds, to national R&D budgets, to levies and specific taxes.	Varying from income self-financing through revenue streams via public-private partnerships to public financing.

With a reference to the example of the mortgage, some basic rules for accessing finance for either Mitigation of Adaptation projects can be identified:

- **Revenue (‘Returns’)**

The better the revenues can be defined, the easier it will be to attract financing. Without direct revenues (e.g. in many cases of coastal management) or uncertain revenues (the technology is only in a pilot stage) the number of financing options is reduced. This applies whether the proposed financing is public, private or a blend. Revenues need not necessarily be financial: socio-economic or environmental benefits may also be considered as revenues by dedicated financiers. In climate change-related financing this particularly creates opportunities, as ultimately the population of our planet will benefit:

⇒ *Insurance companies see their long term revenues endangered, e.g. in agricultural insurances related to crop devastation by storms and floods or their long term obligations such as life insurances and public health issues related to CO₂-emissions; they therefore have a distinct interest in climate change-related technology.*

⇒ *Polluter pays: a simple example of what economists call full costing, where pollution has become an attributable cost, and consequently can generate revenues. CDM, and JI and Carbon Financing are based on this principle and generate new sources of revenue (returns).*

- **Beneficiary and Ownership**

In the mortgage the ‘buyer’ is both the beneficiary and the owner of the house and takes care of maintenance. In Adaptation-projects or programs, often there is no direct beneficiary; it could be a complete country (coastal adaptation in an island-state), or another group of people that is difficult to label. The more ownership-elements can be included into a project or program, the easier it is to identify potential revenues and the more confident a financier will be that objectives will be reached. In case of coastal adaptation in an island state, this could for example mean that the population is motivated (e.g. financial incentives or sanctions, and capacity building) to properly maintain the new coast or to apply agricultural techniques that benefit best from the new circumstances.

By and large, the same financing principles appear to apply to adaptation and mitigation. However, to widen the number of financing opportunities for adaptation-projects, it can be useful to put extra focus on these basic financing-principles during the design-phase.

2.4 Economic and Financial Sustainability

Sustainable development, in its meaning of ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’⁴, is a key word in climate change. For the purpose of this paper, its meaning can be adapted and extended to the economic and financial sustainability of projects.

In climate change, the longer-term viability particularly refers to environmental aspects of projects and processes. Interestingly, financiers are also looking to find sustainability, though in the economic and financial meaning of the word.

Traditionally, economic viability means: benefits outweigh the costs. Financially sustainable, in addition to economically sustainable, means that these benefits pass a hurdle rate of return (‘Internal Rate of Return’ – IRR) indicating that financing can be made available at common terms.

Technology transfer in climate change traditionally does not specifically emphasize economic sustainability. However, to improve the access to financing, applying the concept of economic or financial sustainability is useful. It provides a framework to specify (future) benefits and to determine who will receive these benefits. These recipients then can be considered as potential co-financiers of a technology transfer-project.

This sustainability-approach is standard practice in the private sector, and is increasingly applied in attracting public finance:

- ⇒ The concept of ‘*polluter pays*’ is based on it: the costs (negative benefits) have to be paid for (‘financed’) by the polluter, to make a system (e.g. clean car fuels) financially sustainable (make polluting fuels more expensive and use the proceeds to promote cleaner fuels and motors);
- ⇒ Create a *level playing field* for a sustainable market place in energy efficiency. Investments in energy efficiency have a built-in financial revenue: directly after making the investment you start saving on the energy bill. The issue here is that a level market place is required to make this a financially sustainable revenue stream. Investors (utilities or suppliers of efficient lighting) require secure payments for their services and users need to see a reduction in their costs. In this case a level playing field implies that price-levels need to reflect real costs. Furthermore procedures for payment for services need to be in place (e.g. metering for electricity) and, if needed, can and will be enforced. This implies a shift from general subsidies (nobody really pays for electricity) to market prices with targeted subsidies (e.g. pro-poor and for infant industries) at clear and transparent rules. Under such circumstances a long-term sustainability is created and appropriate financing can be accessed.

Economic sustainability as a criterion will help to focus on longer-term market development (viability) and not just on feasibility (‘one-off projects’). Of course the concern for ‘commercial technology transfer only’ is relevant here, but awareness of this risk also opens opportunities to address it, notably through adequate government involvement:

- Government regulation favoring specific clean technology related market development can be tied to obligations of availability at reduced costs or for specific non-commercial applications;
- Subsidies for technology development can be linked to public access to the results.

⁴ Source: Glossary; IPCC Third Assessment Report

Capacity-building and knowledge transfer are key elements in technology transfer and directly related to economic sustainability. Ensuring involvement and training of (local) stakeholders during the implementation of CC-projects will optimize the chances for success as it creates ownership and ensures adequate fit with local circumstance.

2.5 Technology: Develop or Transfer

Whether to develop new technology or to transfer or apply existing technology is as such not a concern for financiers. However, for accessing financing the difference does matter and this paragraph intends to indicate some key differences and to provide guidelines.

If we take the financier's concept of 'risk-related return' levels as a starting point, it is clear that, on average, transfer of successful existing technology (e.g. into a similar application elsewhere) will be easier to finance than the development of new technology with uncertain outcome.

Access to financing for the transfer of *existing* technology can be further improved using this 'risk-return' concept. In the transfer of existing technology, the added value of undertaking the transfer should be in clear defined benefits for climate change in its new destination. Providing a clear understanding of lessons learned since developing the technology will convince the financiers of the reduced risk. Finally, the project design should include an indication of next steps (value added) by the transfer (e.g. scaling up, or adaptation to local context) and a description of the risks associated with these steps and how to mitigate them.

Essentially, accessing financing for developing new technologies follows the same rules as transferring existing technology. However, it will be much more difficult to apply them:

- It will be more difficult to guarantee the desired outcome;
- The specific climate change-benefits may be more difficult to describe and quantify;
- The expected time-to-market is difficult to guarantee and therefore the pay-back period is uncertain;
- Technology development has a bad reputation in exceeding budgets and it is difficult to give comfort to a financier in this regard;

Crucially important and often quite difficult to substantiate when developing new technologies are the following two issues:

- The future user / buyer of the technology needs to be clearly defined, preferably with concrete indications of interest;
- Most difficult to answer, but crucial for the rationale behind any development-budget is to indicate what the competing technologies are (or will become) and how they compare to the one to be developed.

To compensate for this higher risk-profile, it is useful to indicate how the envisaged new technology relates to other technologies that have already been applied successfully in the context of climate change, and to indicate the small the differences (so limited risks) and maximized lessons learned.

Involvement of implementing partners (public or private) in the development and transfer of technologies may further improve access to financing. Not only that these will have a keen interest in budget-control (low cost makes quick return) and time-to-market, for a financier the involvement of a potential end-user increases the likeliness that the technology may actually generate the benefits that it promises. This demand-side linkage emphasizes that a sustainable, market driven technology can indeed improve access to financing.

Public and private financing resources are available for both transfer and development of technologies. Access to private sources of finance will generally be limited to processes and projects that may lead to a financial return or that otherwise meet private sector interests. In this context the following considerations may apply:

- When designing a project for a longer term, it may be possible to include implementation-elements based on the result of the project, with a private sector link and, consequently, private sector finance; of course there need to be clear deliverables in the interim that can be evaluated;
- Transparency in technology transfer sometimes stops with confidentiality of intellectual property. There are, however, many occasions where strict confidentiality can be avoided and where the sharing of resources multiplies access to financing. and strongly improves the sustainability of a project. Co-makership and licensing are amongst the various options to turn knowledge into an asset that can be financed.
- Ambition is an important driver in technology transfer, but should not turn into a limiting factor. Sometimes realizing short-term tangible (interim-)results can provide easier access to financing although it may not lead to ‘state-of-the art’ projects.
- Finally: every technology-transfer should explicitly address the “make-or-buy” issue. Sometimes buying a proven and readily available technology, although not completely ‘state-of-the-art’ may bring a stronger contribution to mitigating or adapting to climate change than a long-term, uncertain and costly process of creating a slightly better technology.

2.6 Barriers to address and barriers to avoid

In the previous paragraphs we have explored some key tools to develop innovative financing options. The next issue to be dealt with is: when using these tools, what are the main barriers for accessing innovative financing and how can they be addressed.

One important barrier is gradually becoming less difficult to overcome: the ‘Environment’ (‘climate change’ in the vocabulary of financiers) has developed into a recognized theme in financing. In the private sector, especially with leading financiers, the concepts of Socially Responsive Investment (SRI)⁵ and Triple Bottom Line Investment (‘People – Planet – Profit’)⁶ to a large degree have matured into regular management principles. Financing of projects and companies in the environmental sector has become a regular (business) opportunity for many financiers. The financing of wind-turbines (esp. in Europe and North-America) and the waste-recycling sector are clear examples thereof.

In the public sector, it is becoming standard practice that environmental criteria are part of financing arrangements. National governments as well as bilateral and multilateral financial institutions have included environmental sustainability criteria in the assessment of their financing arrangements. Those public financiers who lag behind in this respect face increasing criticism and often are in the process of catching up.

All in all this has led to a general understanding of the opportunities of climate change-related technology and in many cases is leading to interesting new financing products facilitating environment related technology.

For our purposes, we will consider the main barriers for access to financing for technology transfer at three levels: micro, meso, and macro. The intention is to illustrate the effect of the most relevant barriers and to provide some guidelines for dealing with them. Leading thought in this paragraph is that awareness of non-technology transfer-barriers is important as they may hamper access to financing.

⁵ SRI: Socially Responsible Investing is the practice of making investment decisions on the basis of both the financial and social performance of a project or company. The social performance usually includes environmental (or ‘climate change-related’ issues).

⁶ P-P-P: “People-Planet-Profit”, refers to the ‘triple-bottom-line’ (of a profit-and loss statement) for corporate sustainable investments that recognize environmental and social issues as part of the long term goal of (for-profit) organizations

Table 3: Main barriers to access finance for Technology Transfer in the framework of Climate Change

Macro-level barriers: country	
Country Risk	Unstable political or economic system, which keeps away financiers. Hinders longer term financing from public and private resources.
Limited Financial Infrastructure	Lack of professional institutions, regulations actors and experience for a properly functioning financial market. Especially relevant for more complex financing structures and large projects.
Weak, uncertain and unbalanced economic situation	Impedes the sustainability of a market. Limits the capacity to contribute national financing.
Limited Legal Infrastructure	Financial arrangements are based on contracts and legal documentation. This includes issues like rights to land and water, repatriation of capital and registration of ownership. Limits the development and transfer of knowledge and equipment.
Meso-level barriers: sector or theme	
“First-time” effect	Lack of track record increases the risk-perception and holds back financing. Occurs often in climate change related projects. Can sometimes be addressed by linking to existing projects and by creating short-term deliverables.
Regulatory Framework	Restrictive or counterproductive rules and regulations withhold the development of good initiatives and hamper access to financing. Examples include: <ul style="list-style-type: none"> • Private sector involvement in the energy sector requires comprehensive measures in privatization; • Timber-wood concessions need to reflect, monitor and enforce sustainable forest management principles;
Cross Subsidies / Unfavorable Taxation	Specific case of obstructive regulatory framework, where subsidies or taxes serve conflicting interests and work against the effects of the proposed technology transfer. Exemption or policy change is required.
Limited Knowledge Infrastructure or Business Infrastructure	Hampers the development and implementation of technology transfer. Can for a part be addressed by including capacity building and institution building into project-design, although only partially related to direct climate change related benefits.
Micro-level barriers: project	
Capacity in local implementing and other stakeholders.	Basic requirement to be included in project design, in a sustainable way: longer-term focus and linkage to benefits are key words here.
Project- and site-related data	Built-in risk of many climate change projects, as often first-time projects (e.g. river-data for hydro-power station; fertility of the soil in agriculture). To be addressed explicitly in the project design.

As the above table indicates clearly, financing hurdles can be addressed better the closer they relate to the specific project. Especially macro-level barriers are difficult to remove in the context of technology transfer.

There are, however, some ways to reduce the effects of these hurdles:

- Climate Change-issues typically serve the general purpose and therefore create positive side benefits in various sectors. These benefits may be translated into revenues which then can lead to access to additional financing.

- Climate Change-issues pre-eminently are a theme with a strong international component. Support from leading international partners or reference to the positive effects of removing macro-hurdles elsewhere can be effective in accessing financing.
- The limiting effects of barriers (macro and also meso) can sometimes be reduced by trying to avoid them, e.g. selecting smaller scale or less ambitious projects, or by linking to similar existing projects. When avoiding specific risks in the first stage of a project (starting with the “low-hanging fruit”) the effect of the second-phase barriers can be assessed more accurately and, with the track record of a successful project, it may be easier to really address them.

Meso- and macro level barriers usually need to be addressed, either in the context of the project preparation (meso) or as part of the actual project implementation (micro-level barriers), e.g. by specific capacity building activities.

3 General Financing Instruments for Technology Transfer

This paragraph intends to introduce several financing instruments for the financing of technology transfer. It does not intend to provide a complete overview of financing instruments, as this information is widely available for example on the Internet. Annex III suggests some interesting references in this respect.

The goal is to first present some general financing instruments and indicate their link to technology transfer:

- Project finance;
- Public private partnership;
- Build-own-transfer
- Export credit agencies
- Grants and subsidies.

Where possible the specific innovative elements will be highlighted, as well as possible ingredients for application in similar situations.

3.1 Project Finance

Project Finance implies that revenues for the repayment of the financing are generated by the investment ('the project') itself and that the financiers have no collateral ('recourse') other than the investment itself. The crucial element in project finance is the fact that a viable project with a positive cash flow can be financed regardless of the financial situation of the parties involved. Project financing can be relevant when public projects (infrastructure or services) by a government with restricted financing capacity need to access private financing, or when private companies want to access financing without committing their equity.

3.2 Public Private Partnership (PPP)

A PPP usually refers to cooperation between public and private partners to achieve specific objectives with a clear interest for all parties. The rationale for a PPP lays in the fact that partners try to explicitly indicate and align these interests, rather than choosing for a traditional buyer-purchaser relationship which usually focuses more on price/quality related to specific deliverables. Especially in complex and innovative programs or projects this offers the opportunity to meet contingencies in an open and balanced way and it helps to improve the communication between parties via the joint governance structure (e.g. an executive board). PPPs can be useful for 'hard' investments (e.g. building dikes or roads) and 'soft investments' (e.g. developing new technology or a developing and implementing a new code-of-conduct in waste management).

Note: PPP can also mean "People-Planet-Profit" (usually P-P-P; see footnote 6)

3.3 Build – Operate – Transfer (BOT)

Build-Operate-Transfer is a form of cooperation mainly applied in building large and complex infrastructural projects. The essence is that the constructor / operator 'delivers' the project to the buyer (usually a public actor such as a national government) after its operations have been proven successful (according to pre-set standards). Often the constructor / operator also is responsible for arranging the financing of the project. In return, the supplier/operator is has the right to the proceeds of that project (e.g. toll for bridges or tunnels, feed-in tariff of a hydropower station) to compensate for the costs and risks. After a pre-arranged period the constructor /operator hands over the project to the buyer, at no cost. BOT-transactions are typically relevant in the following situations:

- High cost complex projects where risks may only occur after several years, and where one main contractor takes the over-all risks of many sub-contractors;
- Uncertain financial outcome (e.g. the actual power production of the hydropower station) where a substantial equity-commitment of the constructor / operator is required.

The public buyer (government) can ensure that the project is clearly defined with terms and conditions for e.g. the use of renewable energy techniques or other specific climate change related elements.

BOT-projects sometimes tend to look rather expensive, compared to a purely public investment. The BOT-model therefore should be used in cases with clear added value to other models (like PPP), such as the risk of non-performance (timeliness, output, or another item), the risk of exceeding the budget, or the opportunity cost of the project not happening at all.

BOT can also include ownership by the project operator ('BOOT'), or Build – Own – Operate ('BOO') and can also appear in other combinations. (See also reference 1 in Annex III).

3.4 Export Credit Agencies (ECAs)

ECAs are insurance companies for risks associated with export transactions. ECAs are crucial for many export transactions to happen. Traditionally ECAs have public and private shareholders (governments and banks). They often have specific windows, financed by public funds to cover (political) risks that otherwise might hinder environmentally relevant transactions. Governments, as a shareholder and co-investor can influence the preference for specific risks (i.e. subsidize the insurance premium or the acceptance of the risk at all), such as the risks associated with export projects related to mitigation or adaptation to climate change. Moreover, ECAs, like many other insurance companies, tend to have a long-term view, in which the relevance of environmentally sound technologies (ESTs) is gradually being appreciated. Annex IV demonstrates that all leading ECAs do have environmental questions as part of their procedures to assess the impact of the projects they finance.

3.5 Grants and subsidies

The above-mentioned instruments pertain to projects that have the capacity to generate financial revenues. Whenever there is no, or just a limited, capacity to generate commercial returns, grants or subsidies are needed to finance a project. However, as indicated in the above, revenue-based and subsidy financing instruments can be blended or applied together in various forms, that may need to be developed specifically for each project.

For the financing of projects (or processes) without direct and attributable financial revenues, subsidies, contracts or grants are needed. These can be sourced from the public and the private sector.

The contract or agreement that arranges the conditions for a grant or subsidy can explicitly reflect the climate-change context of the budget as well as the right to specific outcomes for the financier. Furthermore the contract can provide an incentive for the likelihood of a good result by providing concessional access to financing for implementation; this can be funded by the same financier, but could also be sourced from the network of the financier.

In projects with financial revenues, subsidies or grants can be needed to finance the non-commercial 'top' of an investment, or e.g. start-up costs that cannot be recovered. It is becoming standard practice that subsidy-contracts are 'output based', stimulate a longer-term sustainable framework ('smart subsidies') and are disbursed in tranches to allow for proper monitoring of results.

An important public source of subsidy-funding is 'Official Development Assistance' (ODA). Recent developments in ODA have created new opportunities to access ODA for climate change related technology transfer. Although increasingly focusing on poverty eradication, poverty is interpreted

wider than just low incomes or “consumption poverty”. The Millennium Development Goals (MDGs)⁷ provide a framework of targets for achieving poverty reduction that contains many climate change related commitments. This creates opportunities to create access to ODA for climate change-related technology development and transfer.

Furthermore, there is a move towards partnerships in achieving common goals, which is also the case in climate change-projects where often a wide group of stakeholders cooperate in a single project. In these partnerships of ODA and climate change-issues, overlaps can be identified which create extra access for financing.

Finally, ODA increasingly tends to become more integrated into sector strategies, which is also the case in climate change projects, which may benefit from this tendency.

In private sector financed grants, the same principles more or less apply. The MDGs have also affected the opportunities for sponsoring and granting, as ‘the environment’ has become a real concern and therefore more eligible for grants. Of course the tendency to link financing to specific outcomes is quite well established in the private sector. The MDGs create a platform to identify benefits, both financial and non-financial that meet the private financier’s objectives, either direct (e.g. emission reduction in clean processes and reducing the costs of pollution-prevention).

⁷ MDG – Millennium Development Goals are eight goals that all 191 UN member states have agreed to try to achieve by the year 2015. The goals are part of the United Nations Millennium Declaration, signed in September 2000 at the World Summit on Sustainable Development. See also Annex V for the link between the MDGs and Energy

4 Climate Change-related Financing Instruments

In this chapter several financing models and financing instruments will be described that have been specifically designed for climate change ('environment') projects. These instruments are managed by *inter alia*:

- Multilateral and Intergovernmental organizations;
- Donor and host countries;
- Non-for profit organizations;
- Brokers and facilitators.

The purpose of the overview is mainly to indicate the innovative components and how these could be applied in similar situations or in another context

4.1 Multilateral and Intergovernmental organizations

4.1.1 The Global Environment Facility (GEF) – Climate Change Program

Article 11 of the Convention defines a mechanism for the provision of financial resources to developing countries on a grant or concessional basis, including for the transfer of technology. The Article also specifies that the financial mechanism shall function under the guidance of, and be accountable to, the Conference of the Parties, which shall decide on its policies, program priorities, and eligibility criteria related to the Convention. COP 4 designated the Global Environment Facility (GEF) as an operating entity of the financial mechanism on an ongoing basis, subject to review every four years.

The GEF-funds are crucial for technology transfer in climate change-related projects, as they are designed to provide funding in cases where financing is most needed and difficult to get. This means that many early-stage capacity building projects can be financed through GEF and that GEF-budgets leverage big amounts of 'hard' investments

Since 1991, approximately US\$1.6 billion was provided in grants from the GEF to climate change activities. An additional amount of more than US\$ 9 billion has been leveraged through co-financing from bilateral agencies, recipient countries and the private sector.⁸ (See also reference 2 in Annex III).

At COP 7 Parties adopted the Marrakech Accords and gave additional guidance to the GEF that expanded the scope of activities eligible for funding, including those in the areas of adaptation and capacity-building. The Marrakech Accords also established three new funds, namely the Special Climate change Fund (SCCF), under the Convention; the Least Developed Countries Fund (LDCF), under the Convention; and the Adaptation Fund (AF), under the Kyoto Protocol. These funds will be managed by the GEF in addition to the GEF Trust Fund that also covers the climate change focal area:

- Special Climate change Fund (SCCF) will finance projects relating to: capacity building, adaptation; technology transfer; climate change mitigation; and economic diversification;
 - Least Developed Countries Fund (LDCF) will support a special work program to assist LDCs;
 - Adaptation Fund (AF) will support adaptation activities when the Kyoto Protocol enters into force.
- The terms and conditions under which these funds will be funded and operated are currently being finalized.

The GEF programs are implemented by three implementing agencies:

- the United Nations Development Program (UNDP);
- the United Nations Environment Program (UNEP);

⁸ Source: "Issues in the Negotiating Process – Financial Mechanism; 3 March 2004 - <http://unfccc.int/issues/financemech.html>

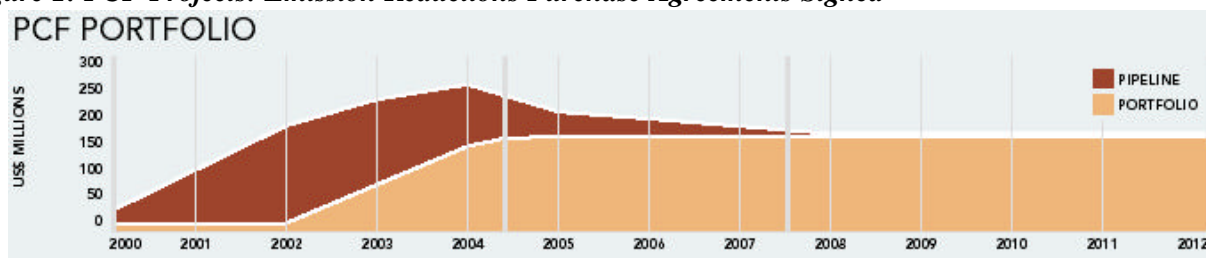
- and the World Bank.

4.1.2 World Bank - Carbon Financing

The World Bank Group has developed various instruments to trade greenhouse gas (GHG) emission rights between nations. (See also reference 3 in Annex III). First of all these funds are innovative because they originate from modern corporate and public responsibility. They reflect a public-private partnership that has mobilized support to operate and achieve results ahead of any formally approved mechanism. Technically speaking these funds are innovative, as they allocate a financial value to mitigation of climate change via a modern trading mechanism that allows all trading partners specific benefits.:

- **The Prototype Carbon Fund (PCF)** – A partnership between 17 companies and 6 governments, the PCF became operational in April 2000. As the first carbon fund, its mission is to pioneer the market for project-based greenhouse gas emission reductions while promoting sustainable development and offering a learning-by-doing opportunity to its stakeholders. The PCF has three mechanisms:
 - Project-based financing mechanisms;
 - Partnerships with the public and private sector to mobilize new resources;
 - “PCFPLUS” to supplement the Prototype Carbon Fund in the areas of research, outreach and training, in response to the need for capacity building of host countries.

Figure 1: PCF Projects: Emission Reductions Purchase Agreements Signed



Source: PCF 2003 annual report

- **The Community Development Carbon Fund (CDCF)** – The CDCF provides carbon finance to small-scale projects in the poorer rural areas of the developing world. The CDCF supports projects that combine community development attributes with emission reductions to create "development plus carbon", and will use financial innovation to improve the lives of the poor. Like the PCF, the CDCF has three windows:
 - Financing mechanisms for new investments in renewable energy and clean technology;
 - Partnerships with the public and private sector to mobilize new resources;
 - “CDCFPLUS” to build and strengthen the capacity of project developers and other intermediaries in these countries, and support first-of-a-kind project preparation, including the identification of community development benefits.
- **The Italian Carbon Fund and The Netherlands Clean Development Facility:** The World Bank and its private sector arm International Finance Corporation (IFC) have also developed other carbon funds with (co)-funding by countries. Similar carbon-financing initiatives are currently being developed by various international financing institutions.

4.1.3 United Nations Environment Program (UNEP)

UNEP is working to create the policy and economic framework where sustainable energy can increasingly meet the global energy challenge. A laudable component in the UNEP-work is

that it combines serving wide and political objectives with fine-tuned and fit-for-purpose initiatives (See also reference 4 in Annex III).

Changing attitudes and helping mainstream financiers to consider sustainable energy investments are the goal of the UNEP Sustainable Energy Finance Initiative (SEFI). With support from the United Nations Foundation, SEFI's goal is to provide current and targeted information to financiers while facilitating new economic tools that combine social and environmental factors - both risks and returns - as integral measures of economic performance.

SEFI is modeled in part on the UNEP Financing Initiative (UNEP FI) initiative as a platform to provide financiers with the tools, support and networks to drive financial innovation that improves the environmental performance of the energy mix. The overall strategy of SEFI is to use this platform and modest amounts of capital to convene financiers, engage them to do jointly what they may have been reluctant to do individually, and to catalyze public-private alliances that together share the costs and lower the barriers to sustainable energy investment.

4.2 Country-based Instruments

4.2.1 The Carbon Trust (United Kingdom)

The Carbon Trust is an independent company funded by UK-Government, working "to help the UK move to a low carbon economy by helping business and the public sector reduce carbon emissions now and capture the commercial opportunities of low carbon technologies". (See also reference 5 in Annex III).

The 2003 UK's Government's Energy White Paper set an aspiration for the UK to reduce carbon emissions by 60% and create a low carbon economy by 2050.

The Carbon Trust intends to achieve this through a step change in energy efficiency and the development and greater use of low carbon technologies (for example, renewables and hydrogen).

Several financing instruments are available via The Carbon trust:

- Promoting an energy efficiency Enhanced Capital Allowances Scheme to encourage investment by business in qualifying energy saving technologies and products;
- Investing in the development of low carbon technologies in the UK;
- Research and development funding to encourage innovation in the low carbon sector through Carbon Vision and Research, Design and Development (R,D &D);
- Technology Acceleration Projects for specific technologies and markets with significant carbon reduction potential and where the Carbon Trust can be material;
- Direct help for pre-commercial and commercial organizations with low carbon technologies through the Carbon Trust's Incubator Program and Venture Capital.

In addition to the direct financing to companies and projects, The Carbon Trust also provides independent information and impartial advice on energy efficiency and carbon management to the business and public sector and thus provides a wide blend of financing and services.

4.2.2 Green Financing (The Netherlands)

The Dutch government encourages environment-friendly developments via instruments such as 'green financing' and 'green investments', so that sustainable housing, wind turbines and organic farms, for example, can attract funding at reduced interest rates. The benefits are threefold: the company obtains a cheaper loan, private investors can invest their money at attractive rates, and the environment benefits from these activities (See also reference 6 in Annex III).

A remarkable element in this program is that it also applies to financing projects in developing countries. As the facility is considered successful, the Dutch government is considering promoting replication of the program in the European Union.

Main project requirements are:

- The project must provide a significant and immediate environmental benefit;
- The project must provide a financial return.

Green financing can be combined with subsidies and other fiscal instruments which support environment-friendly and energy-efficiency investments.

The types of project eligible for green finance include:

- Nature, woodlands and landscape features. Developing and maintaining woodlands and other natural and landscape features and estates, e.g. countryside or other defined areas.
- Organic agriculture. Producing or processing agricultural products in accordance with the requirements of the Order on Organic Production Methods.
- Renewable energy: Generating renewable energy from wood and energy crops, wind turbines, photovoltaic cells, thermal solar energy from solar collectors, geothermal energy and hydropower.
- Voluntary remediation of badly contaminated soil and sediment, based on a remediation plan that has received statutory approval.

4.2.3 “Energy for Rural Transformation” (Uganda)

This project intends to develop Uganda's rural energy and information/communication technologies (ICT) sectors, so that they make a significant contribution to bringing about rural transformation, i.e. These sectors facilitate a significant improvement in the productivity of rural enterprises as well as the quality of life of rural households. The initial part of the project is financed by the World Bank and the GEF. (See also reference 7 in Annex III). From our perspective, the three outstanding elements in this program are that:

- It links the energy-theme to sector development, so that benefits are created whenever access to energy is realized. This improves access to financing.
- It has a bias for climate change positive technologies, which can be enforced by the rules and conditions to access to program (e.g. via subsidies and public tendering);
- The World Bank / GEF funding is structured in a way that it requires and enables the Ugandan program management to raise funds from other public and private sources to achieve the program's objectives.

4.2.4 Polish National Fund for Environment Protection (Poland)

The Polish *National Fund for Environmental Protection and Water Management* (est. 1989) aims at funding environmental protection projects at national, regional and local level. The interesting element in the Fund is that it is financed via an ecology-tax and fines and that its funds are leveraged 100% by the many instruments it uses. (See also reference 8 in Annex III).

Table 4: Financing of environmental investments by the Polish “National Fund for Environmental Protection and Water Management”

	1999 (EUROs)	2000 (EUROs)	2001 (EUROs)	2001 (percents)
Own Resources of Fund	93.80	87.58	87.00	51.00
<i>National Funds</i>	10.56	8.56	6.89	4.00
<i>Foreign Contributions</i>	11.98	6.40	5.37	3.00
<i>Ecological Funds</i>	49.94	32.80	39.82	24.00
<i>National Credits and Loans</i>	26.20	19.20	20.33	13.00
<i>Others</i>	10.50	9.18	8.57	5.00
Total	203.00	164.00	168.00	100.00

Source: Central Statistical Office (2002)

Eligible projects include hard investments and education and vary from air protection to mining.

The Fund applies the following major forms of environmental protection funding:

- *Loan funding* (loans granted by the National Fund; credits granted by banks from the National Fund resources; consortia, i.e. joint funding by the National Fund and banks; credit lines from the National Fund resources, serviced by the banks);
- *Subsidy funding* (project subsidies, subsidies to bank credit interest, remissions);
- Equity funding (shares and stock in newly established and existing partnerships).

Applicants for financial resources may be private companies and public institutions, individuals, schools and NGOs.

As its own publicity material states rightly: “The National Fund for Environmental Protection has essential meaning for environment protection and economy:

- it funds environment protection;
- it starts funds of other investors;
- it stimulates new investments;
- it supports creation of new jobs;
- it is important for sustainable development.”

With such a strong success, it is important that the Fund manages to stay away from an overly bureaucratic and politicized mode of operation.

4.3 Other Financing Models

4.3.1 E+Co

Another category of financing models represents financing for local companies, often Small and Medium Sized companies (SMEs) which are considered important change agents to introduce new technologies in the market.

E+Co is a public purpose investment company that provides investment capital and enterprise development services to local SMEs that supply modern energy to households, businesses and communities in developing countries.

The innovative element in the E+Co approach is that it serves a demand-driven business model that gradually is taking up in various countries. E+Co serves a market niche where modern energy efficiency and renewable energy services and equipment can be applied by SMEs, which do usually fit well in the context of developing countries. (See also reference 9 in Annex III). for more information about E+Co and other SME-oriented programs)

The E+Co model integrates financing and services into a package for entrepreneurs at a modest financial return for its financiers (investors and donors). Apart from seed capital and smaller loans to starting and small companies, E+Co also provides second stage financing to medium sized projects and companies, usually in collaboration with local financial institutions and intermediaries. E+Co works closely with local implementation partners in the countries, as well as with program-funding partners such as a UNEP/UNF co-funded program in Africa.

4.3.2 REEEP

The Renewable Energy and Energy Efficiency Partnership (REEEP) is a coalition of governments, businesses and organizations committed to accelerating the development of renewable and energy efficiency systems. Part of REEEP's work is dedicated to promoting and developing innovative financing (See also reference 10 in Annex III):

- **Market-based incentives.** facilitate and support the development of tradable renewable energy certificates schemes, and other forms of incentive tariffs.

- **Energy Service Companies' (ESCOs)**. Promote ESCOs that provide energy services to customers and act as financial intermediaries between national banks and customers to improve the availability of micro-finance and local credit. Activities will focus on providing incentives for local entrepreneurs and developing greater understanding of energy projects for national and regional banks.
- **Bundling**. Co-ordinate regionally and/or nationally based clearing-houses for bundling of sustainable energy projects at the national and regional level. This will provide international donors and financial institutions with a more flexible approach for project development. It will help match finance with good renewable and energy efficiency projects and reduce overall costs of project development through sharing of supportive financing and credit arrangements necessary to attract additional public/private funding into renewables and energy efficiency projects.

4.4 Deal Brokers and Market Facilitators

With the growing interest of financiers in the potential of climate change-related technology transfer, it becomes increasingly important to provide access to 'deal flow' and to demonstrate the existence of a real pipeline of potential projects to investors. With a wide variety of potential projects and with financiers spread all over the world, dedicated mechanisms are needed to match both parties. Recent and interesting example thereof include:

- The Climate Investment Partnership (CIP), a Geneva-based association of leading public and private financial organizations that seeks to provide upfront financing for projects that promote renewable energy and reduce greenhouse gas (GHG) emissions. CIP's main purpose is to act as an "investment clearinghouse", combining financial resources and specialized expertise to enable projects to proceed. (See also reference 11 in Annex III).
- The Cleantech Venture Network LLC, a market facilitation service supported by private investors that introduces promising young companies to investors and investors to quality deal-flow in the clean technology venture arena. Cleantech Venture's services include venture forums, Venture Monitors and online services to investors and companies. The strong interest in the services of Cleantech Venture is another signal that there are indeed very interesting projects and companies in the clean technology (another proxy of 'climate change' by investors) to invest in, and, as importantly, an indication that financiers do have a sincere interest in climate change-related technology. (See also reference 12 in Annex III).
- BASE International Investment Forum for Sustainable Energy is a specific example of the work of SEFI. BASE is a regular event that brings together key individuals from the finance community and the renewable energy and energy efficiency business. The Forum enables investors to make firsthand contact with innovative sustainable energy starts-ups and projects and to explore investment opportunities directly with the project sponsors. (See also reference 13 in Annex III).
- EcoSecurities Ltd, an environmental finance company which specializes in advising on strategy regarding global warming issues. Expertise in greenhouse gases, renewable energy and sustainable forestry. (See also reference 14 in Annex III).

4.5 Financing Instruments Under Construction

Finally, a view will be provided to some instruments under consideration or under construction. Climate change (often labeled as 'the environment') has become an accepted theme in the world of financing. As this is a relatively recent development there is a number of new financing models and instruments "under construction", in all sectors of the financing industry: private banks, multilateral development banks, private and public donors, etc.

This will open new opportunities to access adequate financing for climate change-related technology development and transfer. It also offers an opportunity (and an obligation) for climate change-experts, researchers and entrepreneurs to exchange views and experiences with the financing community, to optimize the fit between their needs and these new instruments.

Examples of funds ‘under construction’ include:

European Union - Patient Capital Initiative

The European Union is leading an initiative (originating from the WSSD) to develop a renewable energy investment fund that will blend private and public funding and will offer investors a modest long term financial return (“patient capital”).

The plan, currently being prepared, envisages a centralized large-scale investment fund (a so-called fund-of-funds) with regional and sectoral branches and subsidiaries, and with linked budgets for capacity building and project development.

The pioneering element in the fund is that it aims to include the many lessons learned over the last years, and develop a fund-profile that will meet the mid-term investment requirements for a variety of sectors, regions, projects and companies. (See also reference 15 in Annex III).

The Netherlands EBRD Carbon Fund

The government of the Netherlands and the EBRD have created a carbon trading fund. In 2004-2006 the fund will invest €2 million in climate-friendly projects in Central and Eastern Europe. Through the fund, the EBRD will purchase greenhouse gas emission reductions, known as carbon credits, for the Netherlands. This will be done using the Joint Implementation mechanism of the Kyoto Protocol. (See also reference 16 in Annex III).

5 Practical examples: Case studies

This chapter intends to highlight a few case studies to demonstrate the use of some building blocks for innovative financing. The previous chapters have outlined some of the main elements of the attitude of financiers towards climate change-related technology transfer, and a sample of financing instruments and models where these elements have been applied.

The two case studies in this chapter intend to illustrate how these elements can be applied in a specific case and which effects they cause.

The cases intend to blend various financing models and instruments with different types of technology transfer in the context of climate change.

5.1 AT Biopower Co. Ltd

Project: build, own and operate thermal power plants fuelled by rice husks.

Demonstrates:

- blending of various sources of capital, each with a specific interest;
- combining financing models (BOO) and instruments (grants, seed capital, project finance);
- starting with a single entrepreneur's idea, growing towards a middle-sized company;
- direct social and economic benefits included in the project design;
- strong involvement of local stakeholders;
- carbon financing very likely possibility.

Description

A.T. Biopower Ltd is a Thailand incorporated independent power producer (IPP). Its overall objective is to build, own, and operate (BOO) rice husk fueled power plants, with a gross output of 18 MW each. The technology uses is proven elsewhere but new to Thailand. All the power plants would be fueled with rice husks from mills in Central Thailand, the country's most plentiful rice-growing region. The rice husks would otherwise be burnt in the open air or left to decay and now create additional income for a large number of small farmers. The rice husk ash is sold to cement manufacturers, reducing GHG-emissions. The electricity generated by the power plants would be sold to the Electricity Generating Authorities of Thailand (EGAT) under a long-term contract of up to 25 years. The individual power plants would operate on 100% rice husk fuel. Long-term fuel supply agreements have been secured for the A.T. Biopower plants. The plants will be operated by staff recruited from local communities

A.T. Biopower Co., started with a local entrepreneur requesting a small seed capital loan from E+Co, to complete the technical and financial packaging needed to reach financial closure of four 100% rice husk fueled power plants. This relatively small loan was not available in the local financial market and the project met E+Co's criteria of a potentially viable company based on clean energy. With that basis, the entrepreneur managed to finalize the project preparation and accessed next-stage financing of another dedicated financier, Al Tayyar.

Finally, when the technical and legal preparations had been completed, the company had raised financing from bigger project-finance oriented investors such as Rolls Royce Power Ventures (project financing in power sector) , and two Finish organizations, FinnFund (development bank) and Private Energy Market Fund (PEMF – private equity for innovative energy business concepts), for the equity portion of the project. Finally, after carrying out scrupulous due diligence, a consortium of banks has provided the debt portion of the project's financing. The Thai government has provided a 5-year subsidy as well as a purchase guarantee for most of the electricity produced. Financial closure was

achieved to construct four sites. A contractor has been selected from the network of financiers, and is now building the first plant coming on line by the end of 2005. The other 3 plants will follow in sequence after that.

Stakeholder involvement is a key issues in making AT Biopower a success. Not just to get permits from the government but also the ensure long-term support from local farmers and population. With this in mind, ATB's staff members frequently visit the communities living near the ATB project sites, to talk with local government officials, villagers, schoolteachers, and business leaders.

In its relations with local residents, ATB aims to:

- Promote awareness of the ATB project's environmental and social benefits.
- Foster local understanding of renewable energy and energy conservation.
- Make a positive contribution to the local community and society.

For each site, ATB is setting up two types of community-based funds:

- Community Development and Environment Fund. Supports activities that contribute to local well being - e.g. education, physical and mental health, job skills, sports, local customs, religious festivities, and environment. ATB has a particular interest in supporting and working with local schools, for example, sponsoring lunch programs and contributing books to school libraries.
- Environmental Protection Guarantee Fund. Aims to guarantee that ATB will be responsible for damages caused by its power plants to individuals, local communities, and the environment.

(See also reference 17 in Annex III).

5.2 The Poland Efficient Lighting Project (PELP)

Project:

Reduce electricity consumption by stimulating the Polish consumer market for efficient lighting products.

Demonstrates:

- Effective subsidy model, based on clear deliverables;
- Market-based design, influencing consumption and production patterns, has lead to sustainability, capturing the economic benefits of energy efficiency;
- Education and capacity building to create awareness and acceptance.

The project provided subsidies to manufacturers to lower the purchase price of efficient lamps (Compact Fluorescent Lights – CFLs). The subsidies were allotted to manufacturers who had quoted the strongest savings in price and electricity use. The manufacturers financed the subsidies by first selling them at reduced factory prices and then applying for reimbursement.

Originally the PELP was intended to be a leasing or financing arrangement, but several institutional and legal barriers prevented this; leasing was supposed to lead to a more economically sustainable model, as was demonstrated in various similar projects elsewhere.

As lighting absorbs an important portion of electricity production in Poland, efficiency improvement can contribute to peak load reduction benefits. When this benefit turned out to really materialize, the project eventually obtained cooperation from the local electricity utilities.

The program has been successful in achieving the desired effects, i.e. price reduction, the massive and sustained dissemination of CFLs and peak load reduction. Furthermore, it has lead to increased and sustained interest from CFL-manufacturers in the Polish market, which indicates that the 'demand-driven' component of the project worked out well.

Next to the actual subsidy-program, a substantial part of the budget was use for a public education program, including an advertising campaign, which has most likely contributed considerably to the success of the program.

The main program was financed by the GEF. The IFC acted as the implementing agency, as the private sector was the main target of the program.

The total GEF budget for the project was US\$ 5 million. Roughly PELP CFLs, over their lifetime, will save consumers US\$40 million (725 GWh) on their electric bills. The PELP Subsidy program cost US\$7 per ton of avoided emissions

Prior to the start of the main program, funds from the US Agency for International Development had assessed the feasibility of the program. After the GEF-program had been successfully completed (in 1998), various financiers, such as the US Environmental Protection Agency and the German branch of the World Wildlife Fund have contributed to various follow-up activities.

The results and the lessons learned in the PELP have been used in designing other similar programs elsewhere.

(See also reference 18 in Annex III).

6 Guidelines for Innovative Financing

The innovative financing instruments and models illustrated in the previous chapters have indicated that there are indeed existing and emerging options for innovative financing to facilitate technology transfer in the context of climate change. This provides a strong stepping-stone for future technology transfer. This chapter presents some guidelines to initiate and access innovative financing in the design, development and implementation of technology transfer projects.

6.1 Tool 1: Added Value for Stakeholders

Clearly, the added value of mitigation or adaptation to climate change is the key important factor in a project's qualification for adequate financing. This added value can be specified to a level where elements can be described in terms of added value for multiple stakeholders, who then can become interested in co-financing (or assisting in fundraising).

There are many ways to specify these benefits in the design of the project.

An example could be in crop-improvement research when including farmers or potential suppliers as stakeholders: give them a role in the research-project e.g. as pilot-users or to specify the criteria for commercial viability. This may provide access to new (commercial) financiers and improves the feasibility-assessment by traditional donors).

A next step in adding value for stakeholders could be to form a (public-private) partnership in which these partners have a clear role and are accountable for the final result. This may improve the chances of success (or lower the risk of failure), which as such creates better access to financing. In the same example of crop-improvement, public partners could provide (and finance) capacity building or subsidize start-up costs, while private partners could provide equipment or share data and other resources, as 'side-by-side investments'.

One step further, and again taking the same example, the project can be designed as a co-development effort, where ownership of the final results (the new crop or the new agricultural technology) can be owned and sold, e.g. via licenses.

To facilitate the design of such a proposal, the following matrix may help to determine the benefits.

The matrix can be helpful as a means to scrutinize a technology transfer project.

The climate change-related returns and the social return can be substantiated by in various ways. For climate change-returns, the methodology currently used for the Clean Development Mechanism could be a useful reference⁹. For social returns the avoided social costs as well as potential income generating elements can be considered.

Table 5: Composed Technology Transfer Return Matrix

Return Components	Climate Change return	Social return	Economic return	Other returns	Total (Financial) return
Project-phases					
<i>Phase A (e.g. research)</i>					
<i>Phase B (e.g. development)</i>					
<i>Phase C (e.g. pilot implementation)</i>					
<i>Phase D (e.g. commercial implementation)</i>					
Total					

⁹ The so-called 'Project Design Document'.

An example of ‘returns’ that are not financial at first glance could be the case of solar-electricity. The ‘clean energy’ effects for climate change may be limited, as an average 50 Watt-peak system is quite small compared to full fledged grid-electricity and therefore the offset of greenhouse gases is small. However, the replacement of existing energy-sources generates considerable effects:

- Kerosene and candles will be replaced, as well as dry cell batteries;
- Car batteries will be replaced by far more efficient solar-batteries;
- Solar implementation programs need to have a recycling program (opposed to the dumping of car-batteries and dry cell batteries in the base case)
- Human health risks are drastically reduced by avoiding dirty smoke from candles or kerosene and the risks of fire; solar powered lighting is much better reading light than candles etc. so eye-related illnesses will decrease; etc.
- Trading, installing and maintaining solar equipment brings high quality jobs for local population;
- Solar-energy has a few productive uses, such as crop-drying and water pumping
- Carbon-financiers are willing to pay a premium on ‘solar CDM-credits’, expressing these elements of added value

6.2 Tool 2: Linkages to other themes

Financing budgets usually are labeled in specific areas, such as sectors of industry or geographical areas. ‘Climate Change’, or technology transfer related to climate change, often are not amongst those labels. Therefore it makes sense to design and develop financing proposals in line with the most likely labels they will be assessed under.

In the public sector, a dominant cluster of financing labels is directly related to the results of the World Summit on Sustainable Development (WSSD). This 2002-conference has led to ‘re-labeling’ of important financial resources as well as to substantial additional financial resources, in line with the goals agreed upon during that summit. Annex V shows how the issue of Energy, which as such was *not* an item at the WSSD, links to many of the results (the so-called Millennium Development Goals, MDGs). Similar linkages can be developed and applied for other climate change themes.

Another way of widening access to financing is to integrate climate change-related technology transfer into conventional sector strategies.

For example: rural development plans or irrigation programs, have a clear economic benefit that is recognized and that supports access to adequate financing. These programs often are quite large in financial terms and can include excellent opportunities to transfer technology related to climate change, both in terms of adaptation and mitigation. Adding such technology transfer elements to these programs (either research or implementation) may be quite relevant in relation to climate change, and could be limited in financial costs in relation to the total costs of the project. Integrating climate change-issues may even provide access to a new segment of financiers.

Finally, the clustering of sectoral elements can sometimes be achieved: building a hydropower station (strong economic benefit and as such enabling adequate financing) that supplies water to small farmers for irrigation (strong economic benefits but moderate to low capacity to finance) and providing clean potable water (low direct economic benefit but crucial for human health).

6.3 Tool 3: Loud, Long, Legal – an Effective Policy Framework

Until now this paper largely has dealt with instruments and models that can, to a certain extent, be influenced directly from the climate change point of view. However, creating innovative options to finance the transfer and the development and transfer of technologies also depends on the larger context of national and international developments.

Major themes in this arena come together in the requirement of an effective policy framework to access and provide financing.

Without going into detail, as this would be outside the scope of this paper, the importance of the policy framework should be mentioned here.

Recently an effort was made by the finance sector to call for an adequate policy framework to finance renewable energy projects, both in OECD countries as elsewhere. This statement is a good example to demonstrate the interest of the finance sector and, at the same time, provide some guidelines for improved policy frameworks. As such it also applies to other sectors in climate change.

“The following position statement summarises – from the finance sector’s point of view - the key characteristics of government policy necessary to increase investor interest in renewable energy. It is based on consultation discussions among bankers, investors, insurers, and financial experts in the lead up to the Bonn International Conference for Renewable Energies in June 2004. In addition, the discussions raised matters for the finance sector itself to consider, including issues in the area of risk management, awareness raising & capacity building, and new financial products.

Core Policy Recommendations

Strength, clarity, and stability are decisive characteristics of the policy environment that attracts capital to renewable energy: that environment must be specific enough to improve the bankability of projects and provide conditions for steady market growth in the renewables sector. An effective policy framework must be ‘loud, long, and legal’:

- **Loud** – the signal to the market, through incentive structures or other means, needs to be ‘loud’ and clear to attract capital into the sector;
- **Long** – rules and incentives need to be stable and sustained for a duration that reflects the financing horizons of the projects;
- **Legal** – a legally-established regulatory framework based around binding targets or implementation mechanisms is needed to provide the basis for long-life capital-intensive investments.

It is important to note that at the early stage of development of the newer renewable energy technologies, supplementary incentives that support technology innovation are required in order to provide an environment that rewards entrepreneurial activity.” (See also reference 19 in Annex III).

Annex I: Glossary of Financing Terms

Term	Description in the context of this paper
Angel Investor	A financial backer providing venture capital funds for small start-ups or entrepreneurs. Typically, angel investors are friends or family members.
Balance Sheet	A company's financial statement. It reports the company's assets, liabilities, and net worth at specific time. If the balance sheet is "consolidated" it just means that the company is a corporate group rather than one single company.
Bank Guarantee	A guarantee from a lending institution ensuring that the liabilities of a debtor will be met. In other words, if the debtor fails to settle a debt, the bank will cover it. A bank guarantee enables the customer (debtor) to acquire goods, buy equipment, or draw down loans, and thereby expand business activity.
Basis Point - BPS or BIPS	A unit for measuring a bond's yield that is equal to 1/100th of 1% of yield. 1% change = 100 basis points. 0.01% = 1 basis point. A bond whose yield increases from 5.0% to 5.5% is said to increase by 50 basis points.
BOT (Build-Operate-Transfer) (Also BOOT-Build-Operate-Own-Transfer)	In BOT private organizations undertake development and operation of a facility normally done by the government. The termination of the private sector involvement occurs at the return of the ownership of the facility to the government after a fixed concession period, usually 15 to 40 years. In the BOT approach, a private party or concessionaire retains a concession for a fixed period from a public party, called principal (client), for the development and operation of a public facility. The development consists of the financing, design and construction of the facility, managing and maintaining the facility adequately, and making it sufficiently profitable. The concessionaire secures return of investment by operating the facility and, during the concession period, the concessionaire acts as owner. At the end of the concession period, the concessionaire transfers the ownership of the facility free of liens to the principal at no cost. The two other schemes that appear most similar to BOT are Build Own Operate (BOO) and Build Transfer Operate (BTO). In all three cases, the private party retains revenues from operating the facility. In BTO, the private party transfers the ownership of the facility directly after the delivery and operates the facility on behalf of the principal. In BOO, the private party retains ownership of the facility, makes returns on investment by operating it for its useful life, and may sell it at any point at market value.
Carbon Trade	An idea presented in response to the Kyoto Protocol that involves the trading of greenhouse gas (GHG) emission rights between nations. For example, if Country A exceeds its capacity of GHG and Country B has a surplus of capacity, a monetary agreement could be made that would see Country A pay Country B for the right to use its surplus capacity. A nation that finds it hard to meet its target of reducing GHG could pay another nation to reduce emissions by an appropriate quantity.
Collateral	Properties or assets that are offered to secure a loan or other credit. Collateral becomes subject to seizure on default. Collateral is a form of security to the lender in case the borrower fails to pay back the loan. For example, if you open a mortgage, your collateral would be your house.
Co-makership	The long-term relationship between a limited number of stakeholders, where technology is developed or transferred on the basis of mutual confidence and clear benefits for the parties.
Corporate Finance	Any financial or monetary activity that deals with a company and its money.
Country Risk	The risk that a country will not be able to honor its financial commitments. When a country defaults it can harm the performance of all other financial instruments in that country, as well as other countries.
Debt	An amount of money owed from one person or firm to another . Bonds, loans, and commercial paper are all examples of debt.
Equity	Stock, or any security, representing an ownership interest.

Term	Description in the context of this paper
Escrow	A financial instrument held by a third party on behalf of others until their written or oral instructions or obligations have been fulfilled. Securities, funds and other assets can be held in escrow.
Infant Industry Theory	A school of thought that believes emerging domestic industries should be protected until they become stable and mature. Proponents of the infant industry theory argue that governments should use tariffs, quotas, and duty taxes to keep international competitors from ruining the domestic infant industry.
Internal Rate of Return – IRR	Often used in capital budgeting, it's the interest rate that makes net present value of all cash flow equal zero. Essentially, this is the return that a company would earn if they expanded or invested in themselves, rather than investing that money abroad.
Lease	An agreement in which one party gains a long-term rental agreement, and the other party receives a form of secured long-term debt. The lessee gains a long-term contract for the use of an asset, and the lessor is assured of regular payments for a specified number of years.
Leverage	The amount of debt used to finance a firms assets. A firm with significantly more debt than equity is considered to be highly leveraged.
Loan	When a lender gives money to a borrower, and the borrower agrees to repay the borrowed money along with interest, at a predetermined date in the future
Mezzanine Financing	1. Financing that combines debt and equity. The importance of this method of financing is that it allows companies to raise capital by increasing debt without giving up large equity positions.
Non-Recourse Finance	A loan where the lending bank is only entitled to repayment from the profits of the project the loan is funding, not from other assets of the borrower. These types of projects are characterized by high capital expenditures, long loan periods, and uncertain revenue streams. Analyzing them requires a sound knowledge of the underlying technical domain as well as financial modeling skills.
Offshore	Located or based outside of one's national boundaries. The term offshore is used to describe foreign banks, corporations, investments, and deposits. A company may move offshore for the purpose of tax avoidance or relaxed regulations.
Opportunity Cost	The difference in return between a chosen investment and one that is necessarily passed up. For example the opportunity cost of going to college is the money you would have earned if you worked instead. Or, if a gardener decides to grow carrots, his or her opportunity cost is the alternative crop that might have been grown instead.
Project Finance	The financing of long-term infrastructure, industrial projects and public services based upon a non-recourse or limited recourse financial structure where project debt and equity used to finance the project are paid back from the cash flow generated by the project. In other words, project financing is a loan structure that relies primarily on the project's cash flow for repayment, with the project's assets, rights, and interests held as secondary security or collateral. Project finance is especially attractive to the private sector because they can fund major projects off balance sheet.
Return	The gain or loss for a security in a particular period, consisting of income plus capital gains relative to investment. It is usually quoted as a percentage. The general rule is: the more risk you take the greater the potential for higher return... and loss.
Seed Capital	The initial equity capital used to start a new venture or business. This initial amount is usually quite small because the venture is still in the idea or conceptual stage. Seed capital is usually a small amount because there's a high risk that the venture will fail.
Senior Debt	A debt which receives priority for repayment in the event of a corporation's liquidation and has adequate collateral. This represents a relatively small risk for financiers and results in a relatively low interest rate.
Socially Responsible Investment - SRI	Investments or funds containing stock in companies whose activities are considered ethical. There are a large variety of socially responsible investments available, depending on the ethical issues with which the socially responsible investor is concerned.

Term	Description in the context of this paper
Special Purpose Vehicle/Entity - SPV/SPE	Also referred to as a "bankruptcy-remote entity" whose operations are limited to the acquisition and financing of specific assets. The SPV is usually a subsidiary company with an asset/liability structure and legal status that makes its obligations secure even if the parent company goes bankrupt. They used to isolate financial risk. A corporation can use such a vehicle to finance a large project without putting the entire firm at risk.
Structured Finance	A service offered by many large financial institutions for companies with very unique financing needs. These financing needs usually don't match conventional financial products such as a loan. Structured finance generally involves highly complex financial transactions.
Transaction Costs	Costs incurred when assessing or monitoring financial commitments (loans and equity but also subsidized programs). Typically these costs are relatively high for smaller projects. Although these costs may be considerable in large projects, they only reflect a small portion and can therefore be justified more easily. In smaller projects these costs form an important obstacle, that sometimes can be removed by clustering projects or by increasing the period over which a project runs.
Venture Capital	Money and resources made available to startup firms and small businesses with exceptional growth potential. 0en0000 capital often also includes managerial and technical expertise. Most venture capital money comes from an organized group of wealthy investors. This form of raising capital is increasingly popular among new companies that, because of a limited operating history, can't raise money through a debt issue. The downside for entrepreneurs is that venture capitalists usually receive a say in the major decisions of the company in addition to a portion of the equity.

Source: partially based on and adapted from <http://www.investopedia.com/terms>

Annex II: Glossary of Climate Change related terms

Term	Description in the context of this paper
Adaptation	Adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.
Annex B countries/Parties	Group of countries included in Annex B in the Kyoto Protocol that have agreed to a target for their greenhouse gas emissions, including most Annex I countries.
Annex I countries/Parties	Group of countries included in Annex I (as amended in 1998) to the UNFCCC, including all the developed countries in the Organisation for Economic Cooperation and Development, and economies in transition. By default, the other countries are referred to as non-Annex I countries. Annex I countries commit themselves specifically to the aim of returning individually or jointly to their 1990 levels of greenhouse gas emissions by the year 2000.
Annex II countries	Group of countries included in Annex II to the United Nations Framework Convention on Climate Change, including all developed countries in the Organisation for Economic Cooperation and Development. These countries are expected to provide financial resources to assist developing countries to comply with their obligations, such as preparing national reports. Annex II countries are also expected to promote the transfer of environmentally sound technologies to developing countries.
Kyoto Mechanisms	Economic mechanisms based on market principles that Parties to the Kyoto Protocol can use in an attempt to lessen the potential economic impacts of greenhouse gas emission reduction requirements. They include the Clean Development Mechanism, Joint Implementation, and Emissions Trading.
Clean Development Mechanism (CDM)	The Clean Development Mechanism is intended to meet two objectives: <ul style="list-style-type: none"> (1) to assist Non-Annex I Parties in achieving sustainable development and in contributing to the ultimate objective of the convention; (2) to assist Annex I Parties in achieving compliance with their quantified emission limitation and reduction commitments. Certified Emission Reduction Units from CDM projects undertaken in non-Annex I countries that limit or reduce greenhouse gas emissions, when certified by operational entities designated by Conference of the Parties / Meeting of the Parties, can be accrued to the investor (government or industry) from Parties in Annex B. A share of the proceeds from the certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation
Joint Implementation (JI)	A market-based implementation mechanism, allowing Annex I countries or companies from these countries to implement projects jointly that limit or reduce emissions, or enhance sinks, and to share the Emissions Reduction Units
Emissions trading	A market-based approach to achieving environmental objectives that allows those reducing greenhouse gas emissions below what is required, to use or trade the excess reductions to offset emissions at another source inside or outside the country. In general, trading can occur at the intracompany, domestic, and international levels

Term	Description in the context of this paper
Kyoto Protocol	The Kyoto Protocol to the UNFCCC was adopted in 1997 in Kyoto, Japan. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most countries in the Organisation for Economic Cooperation and Development, and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) by at least 5% below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol has not yet entered into force (September 2004).
Intergovernmental Panel on Climate Change (IPCC)	The IPCC was established by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. It is open to all Members of the UN and of WMO. See www.ipcc.ch .
Mitigation	An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases.
Non-Annex I countries/Parties	The countries that have ratified or acceded to the United Nations Framework Convention on Climate Change that are not included in Annex I of the Climate Convention.
Technology Transfer	<p>Article 4.5 of the UNFCCC states: <i>“The developed countries and other developed countries in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of or access to environmentally sound technologies and know how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.”.....</i></p> <p>Technology transfer is a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions. Therefore, the treatment of technology transfer in this Report is much broader than that in the UNFCCC or of any particular Article of that Convention. The broad and inclusive term “transfer” encompasses diffusion of technologies and technology cooperation across and within countries. It covers technology transfer processes between developed countries, developing countries and countries with economies in transition, amongst developed countries, amongst developing countries and amongst countries with economies in transition. It comprises the process of learning to understand, utilize and replicate² the technology, including the capacity to choose it and adapt it to local conditions and integrate it with indigenous technologies. <i>(from IPCC Special Report - Summary for Policymakers - Methodological and technological issues in Technology transfer)</i></p>
United Nations Framework Convention on Climate Change (UNFCCC)	Its ultimate objective is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” It contains commitments for all Parties. Under the Convention, Parties included in Annex I aim to return greenhouse gas emissions to 1990 levels by the year 2000. The Convention entered into force in March 1994.

(Source: adapted from “Glossary; IPCC Third Assessment Report, unless indicated otherwise”

Annex III: References

This annex contains selected references to documents and websites that provide more background information on specific issues.

References explicitly mentioned in the text

1. BOT: more information and case studies regarding Build-Operate-Transfer can be found in “Case Studies On Build Operate Transfer”, by Sebastiaan Menheere and Spiro Pollalis, in http://www.gsd.harvard.edu/~pollalis/books/bot_part_1.pdf
2. Global Environment Facility: <http://www.gefweb.org>.
3. World Bank Carbon Funds: background and an overview of projects <http://carbonfinance.org/pcf/>. Carbon Financing by the IFC, the private sector arm of the World bank Group: <http://ifcln1.ifc.org/ifcext/enviro.nsf>
4. The United Nations Environment Program (UNEP) for and about Financial Institutions <http://unepfi.net/> (sub-page on climate change: <http://unepfi.net/cc/>)
United Nations Environment Programme (UNEP): <http://www.unep.org>
 - UNEP Sustainable Energy Finance Initiative (SEFI) <http://www.sefi.unep.org>:
 - UNEP Finance Initiative (Innovative Financing for Sustainability) <http://unepfi.net/>
5. The Carbon Trust: <http://www.thecarbontrust.co.uk>
6. ‘Green Financing’ in The Netherlands: Attractive investment conditions for projects and tax-exempted returns for private investors. English brochure at website <http://www.novem.nl/default.asp?documentId=18791>
7. Uganda “Energy for Rural Transformation”: <http://www.energyandminerals.go.ug> and <http://web.worldbank.org/external/projects/main?pagePK=104231&theSitePK=40941&menuPK=228424&Projectid=P069996>.
8. National Fund for Environmental Protection and Water Management . www.pldgl.pl/p/en/TarJ/18/2/6
9. E+Co and other examples of the programs that focus on Small and Medium Size Enterprises:
 - www.energyhouse.com
 - www.ared.org; www.b-reed.org; www.c-reed.org
 - Ugandan DFCU and Shell Foundation: leasing of renewable energy equipment http://www.dfcugroup.com/leasing_energy.php
 - Empowerment Through Energy Fund (ETEF), a South Africa based public-private partnership between RAPS-Finance, Shell Foundation, European Union, ABSA-Bank and Industrial Development Corporation and Shell Southern Africa. <http://www.shellfoundation.org/energise/etef/>
10. Renewable Energy and Energy Efficiency Partnership (REEEP - <http://www.reeep.org>). REEEP will promote development of innovative and appropriate financing and funding models, including through providing:
 - Targeted Enterprise Facilitation Services to bring together actors necessary to take projects from incubation to viable operating entities. Ensure appropriate cross-fertilization of experiences;
 - Seed Capital “Draw-down” Facility: To provide access to capital from existing programs to help promoters cover upfront transaction costs in an arena where financing is not available and where projects have demonstrated potential;
 - Support for Third Party Capacity Building Programs for local Financial Institutions;
 - Creation of Library of Finance and project documentation (PPAs, term sheets, PPMs, etc.);
 - Provide Endorsement/Sponsorship of REEEP branded initiatives to raise profile and draw support (capital) from donors and investors; and
 - Alert donors and investors of opportunities for contributing to initiatives being developed by REEEP.
11. Climate Investment Partnership (CIP): www.climateinvestors.com.

12. Cleantech Venture Capital network for clean technology: <http://www.cleantechventure.com/>
13. BASE Investment Forum: <http://www.energy-base.org>
14. EcoSecurities Ltd.: <http://www.ecosecurities.com>.
15. JREC – PCI: <http://forum.europa.eu.int/Public/irc/env/ctf/library>
16. The Netherlands EBRD Carbon Fund : <http://www.ebrd.com/carbonfinance>
17. AT Biopower:
 - Website <http://www.atbiopower.co.th>
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http://cdm.unfccc.int/methodologies/UserManagement/FileStorage/FS_102028254
18. Poland Efficient Lighting Project - IFC review of the project:
<http://www.gefweb.org/wprogram/July98/wp/eli6.doc> and an article by Chris Granda, Vermont Energy Investment Corporation:
http://www.iaeel.org/IAEEL/Archive/Right_Light_Proceedings/Proceedings_body/BOK4/RL42gran.pdf
19. Financial Sector: Statement On Renewable Energy:
www.reeep.org/media/downloadable_documents/o/a/Financial%20Sector%20Policy%20Statement%20for%20Bonn.pdf

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<http://www.grida.no/climate/ipcc/tectran/001.htm>
- Development Capital for Energy Access; opportunities to reach the energy-poor. A publication by the Finance Working Group of the Energy Initiative for Poverty Eradication and Sustainable Development (EUEI) -
http://europa.eu.int/comm/development/body/theme/energy/initiative/docs/EUEI_fwg_paper_022004_en.pdf
- Free downloads on the subject of sustainable finance and banking and information about five books on this subject <http://www.sustainability-in-finance.com>.
- Guidelines and glossary for project development related to the mechanisms of the Kyoto-Protocol. <http://www.dti.gov.uk/ccpo/projects.htm>.
- Electronic Magazine “Environmental Finance”: <http://www.environmental-finance.com>
- Project Finance Portal of Harvard Business School, with practical and background information and web-links on project finance, public private partnerships and export-credit agencies. <http://www.hbs.edu/projfinportal/>

Annex IV: Summary of ECA Impact Assessment Procedures

This table indicates that all Export Credit Agencies in the survey did have environmental questions as part of their procedures to assess the impact of the projects they finance. The results for the environmental assessment were the same in 2002 as in 2003.

ECA	Threshold	Number of stages / questions	Sectors where IQ required	Environmental	Social	Human rights
CESCE	-	1-2 / <20	All	✓	✓	Planned to be introduced in 2004
COFACE	Contract €10m	2 / <19	All except aerospace, ships, satellites & telecoms	✓	✓	✓
ECGD	-	6 questions in application forms, then: Low Impact = 0 Med Impact = IQ (13) High Impact = Full EIA	All except aerospace & defence	✓	✓	✓
EDC	Project SDR 10m	1 / 12	All	✓	✓	✓ (part of political risk)
EKN	No threshold for initial screening. SEK 100m for further screening and review.	3 questions in application forms, then 9 questions in environmental questionnaire for category A and B projects. Full EIA for category A.	All: 3 first questions. All category A and B sectors: additional 9 questions. Non-project goods exempted.	✓	✓	✓ (included in social)
EXIM	Project US\$10m	2 / <14	High-risk sectors* only Non-project goods exempted	✓	✓**	
ATRADIUS	Contract €10m Project €50m	1 / 23	High-risk sectors* only Aircraft manufacturing & defence equipment exempted	✓	✓	
EULER HERMES	Project € 15 m	1 / 6	All except transport & telecoms	✓	✓	
NEXI	-	1 / 14	All	✓	✓	✓
SACE	Project SDR 10m	2 / <20	All except aerospace, defence & telecoms (excluding telecom infrastructures)	✓	✓	

*High risk sectors include: green field sites, significant environmental impacts and long term impacts on population (inc. damage to cultural property and resettlement)

** Social Impact (i.e. cultural heritage, involuntary resettlement, and indigenous peoples)

Source: ECGD International Comparison Survey - October 2003
<http://www.ecgd.gov.uk/intcompfinal2004.pdf>

Annex V: Matrix Of Energy And Millennium Development Goals

(Source: “Energy for the Poor; Underpinning the Millennium Development Goals” DfID, 2002, page 27)

IMPORTANCE OF ENERGY TO ACHIEVING THE GOAL

Goal	Directly contributes	Indirectly contributes
<p>1) Extreme poverty and hunger</p> <ul style="list-style-type: none"> • To halve, between 1990 and 2015, the proportion of the world’s people whose income is less than one dollar a day. • To halve, between 1990 and 2015, the proportion of people who suffer from hunger. 	<ul style="list-style-type: none"> • Access to reliable energy services enables enterprise development • Lighting permits income generation beyond daylight hours • Increased productivity from being able to use machinery • Local energy supplies can often be provided by small scale, locally owned businesses creating employment in local energy service provision and maintenance, fuel crops, etc. • The majority (95%) of staple foods need cooking before they can be eaten and need water for cooking. • Improving productivity throughout the food chain (in tilling, planting, harvesting, processing, transport etc.) • Reduction of post harvest losses through better preservation (for example, drying and smoking) also through chilling/freezing 	<ul style="list-style-type: none"> • Modern energy supplies are necessary for economic growth, supply must be pro-poor in design, and inclusive of the rights of people in the design of their basic services • Efficient energy systems reduce costs, help create sustainable businesses/jobs and economies and underpin the social fabric of a region. • Privatisation of energy services can help free up government funds for social welfare investment • Clean, efficient fuels reduce the large share of household income spent on cooking, lighting and keeping warm (equity issue - poor people pay proportionately more for basic services) • Energy for irrigation helps increase food production and access to nutrition. Clean water helps improve health. Increased health and nutrition open up opportunities for employment and income generation. • Chemical fertilisers are a form of captured energy, particularly ammonia-based ones where natural gas is the feedstock – indirect use of gas increases crop yields

Goal	Directly contributes	Indirectly contributes
<p>2) Universal primary education</p> <ul style="list-style-type: none"> To ensure that, by 2015, children everywhere will be able to complete a full course of primary schooling. 	<ul style="list-style-type: none"> Energy can help create a more child friendly environment (access to clean water, sanitation, lighting and space heating/cooling) thus improving attendance at school and reducing drop out rates. Availability of modern energy services frees children's and especially, girls' time from helping with survival activities (gathering firewood, fetching water); lighting permits home study Lighting in schools allows evening classes and helps retain teachers, especially if their accommodation has electricity Electricity enables access to educational media and communications (ICTs) in schools and at home that increase education opportunities and allow distance learning 	<ul style="list-style-type: none"> Access to energy provides the opportunity to use equipment for teaching (overhead projector, computer, printer, photocopier, science equipment) Modern energy systems and efficient building design reduces heating/cooling costs and thus school fees, enabling poorer families greater access to education
<p>3) Gender equality and women's empowerment</p> <ul style="list-style-type: none"> Ensuring that girls and boys have equal access to primary and secondary education, preferably by 2005, and to all levels of education no later than 2015. 	<ul style="list-style-type: none"> Availability of modern energy services frees girls' and young women's time from survival activities (gathering firewood, fetching water, cooking inefficiently, crop processing by hand, manual farming work) Good quality lighting permits home study Electricity enables access to educational media and communications (ICTs) in schools and at home that increase education opportunities and allows distance learning 	<ul style="list-style-type: none"> Lighting in schools allows evening classes and helps retain teachers especially if their accommodation has electricity. Street lighting improves women's safety Reliable energy services offer scope for women's enterprises
<p>4) Child mortality</p> <ul style="list-style-type: none"> To reduce by two-thirds, between 1990 and 2015, the death rate for children under the age of five years 	<ul style="list-style-type: none"> Indoor air pollution contributes to respiratory infections that account for up to 20% of the 11 million deaths in children each year (WHO data) Gathering and preparing traditional fuels exposes young children to health risks and reduces time spent on child care Modern energy can be safer (fewer burns, accidents and house fires) 	<ul style="list-style-type: none"> Provision of nutritious cooked food, space heating and boiled water contribute towards better health Electricity enables pumped clean water and purification Cold chain provision allows access to vaccinations

Goal	Directly contributes	Indirectly contributes
<p>5) Maternal health</p> <ul style="list-style-type: none"> To reduce by three-quarters, between 1990 and 2015, the rate of maternal mortality. 	<ul style="list-style-type: none"> Energy services are needed to provide access to better medical facilities for maternal care, including medicine refrigeration, equipment sterilisation and operating theatres 	<ul style="list-style-type: none"> Excessive workload and heavy manual labour (carrying heavy loads of fuelwood and water) may affect a pregnant woman's general health and well-being. Energy can help produce and distribute sex education literature and contraceptives ICTs for long distance learning and 'distance medicine' requires a power supply Provision of nutritious cooked food, space heating and boiled water contribute towards better health and all need energy
<p>6) HIV/AIDS, malaria and other major diseases By 2015, to have halted and begun to reverse:</p> <ul style="list-style-type: none"> the spread of HIV/AIDS the scourge of malaria the scourge of other major diseases that afflict humanity. 	<ul style="list-style-type: none"> Electricity in health centres enables night availability, helps retain qualified staff and allows equipment use (e.g, sterilisation, medicine refrigeration) Energy for refrigeration allows vaccination and medicine storage for the prevention and treatment of diseases and infections Safe disposal of used hypodermic syringes by incineration prevents re-use and the potential further spread of HIV/AIDS 	<ul style="list-style-type: none"> Energy is needed to develop, manufacture and distribute drugs, medicines and vaccinations Electricity enables access to health education media through ICTs
<p>7) Environmental sustainability</p> <ul style="list-style-type: none"> To stop the unsustainable exploitation of natural resources; and To halve, between 1990 and 2015, the proportion of people who are unable to reach or to afford safe drinking water 	<ul style="list-style-type: none"> Increased agricultural productivity is enabled through the use of machinery and irrigation, which in turn reduces the need to expand quantity of land under cultivation, reducing pressure on ecosystem conversion Energy can be used to purify water or locally pump clean ground water, reducing time spent collecting it and reducing drudgery. Traditional fuel use contributes to erosion, reduced soil fertility and desertification: this can become more sustainable through substitution, improved efficiency and energy crops Using cleaner, more efficient fuels will reduce greenhouse gas emissions, which are a major contributor to climate change 	<ul style="list-style-type: none"> Clean energy production can encourage better natural resource management, including improved water quality National sustainability aided by greater use of indigenous renewable energy sources instead of imported fossil fuels as economy grows Rural energy services enable non-farm-based enterprise and processing of non-timber forest products Efficient use of energy helps to reduce local pollution and improve conditions for poor people
