Smart climate finance

Designing public finance strategies to boost private investment in developing countries

giz Climate Protection Programme

On behalf of
Federal Ministry
for Economic Cooperation
and Development

Imprint

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Abbreviations

AMC	Advance Market Commitments
BASE	Basel Agency for Sustainable Energy
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BMZ	Ministry of Economic Cooperation and Development
CABEI	Central American Bank for Economic Integration
CaPP	Climate protection program for developing countries
CDM	Clean Development Mechanism
CECIC	China Energy Conservation and Investment Corporation
CER	Certified Emission Reduction
CFI	Commercial Financial Institution
DFI	Development Financial Institution
EE	Energy Efficiency
EFSE	European Fund for Southeast Europe
ESCOs	Energy Service Companies
FS	Frankfurt School of Finance & Management
GCPF	Global Climate Partnership Fund
GEF	Global Environment Facility
GET FiT	Global Energy Transfer Feed in Tariffs
GIZ	German International Cooperation
IFC	International Finance Corporation of the World Bank Group
IFI	International Financial Institutions
JI	Joint Implementation
JV	Joint Venture
KfW	German Development Bank
NAMAs	Nationally Appropriate Mitigation Actions
PFI / PFM	Public Finance Instrument / Mechanism
PPA	Power Purchase Agreement
RE	Renewable Energy
SE	Sustainable energy (RE/EE)
SEF	Sustainable Energy Finance
(M) SME	(Micro) Small Medium Enterprise
TA	Technical Assistance
UNFCCC	United Nations Framework Convention on Climate Change

Introduction

In order to achieve a 50 percent reduction in carbon dioxide emissions by 2050, total financing to 2050 of around EUR 30 trillion will be required – or around EUR 800 billion per year – according to the International Energy Agency.[1] The United Nations Framework Convention on Climate Change has concluded that a significant majority of this investment will need to come from the private sector.[2] Much of this investment needs to be done in the developing world, but private investors are currently not motivated to undertake the level of investment needed in developing countries due to the high risk. Moreover, regardless of how much incentive the private sector is given, there are certain market barriers that it cannot overcome and financing gaps that it cannot fill. Public financing will therefore be needed in certain critical areas for both the short and long term, as reflected in the final report of the High-Level Advisory Group on Climate Finance.[3]

Public Finance Instruments (PFIs) for low-carbon development are publicly backed interventions that help to close financing gaps, overcome market barriers, and accelerate market uptake of low-carbon measures. When PFIs are designed to maximise the leverage of additional private finance, they can deliver ratios of between 3:1 and 15:1 in private finance leveraged per public monies spent.

This report has been prepared for the German International Cooperation (GIZ) Climate Protection Programme in Developing Countries ("CaPP") by Frankfurt School of Finance and Management (FS) in partnership with the Basel Agency for Sustainable Energy (BASE), drawing on the best up-to-date research and experience in the field. It recommends options and strategies for public finance engagement in the following seven countries considered in this study:

Latin America	Asia	Africa
Brazil	India	Morocco
Costa Rica	Thailand	Namibia
	Vietnam	

The recommendations also draw on in-depth analysis of the individual target country contexts; identification of existing risks and constraints on local low-carbon investment; interviews with local private investors; and a review of existing public finance instruments active in these countries. This report should be seen as a welcome addition to the existing body of PFI research in that it discusses low-carbon PFI engagement in the context of a country-based, programmatic approach, which many experts have argued is the most appropriate direction for the field of development overall.

1 IEA (2008), Energy Technology Perspectives: Scenarios and Strategies to 2050.
2 UNFCCC (2007), Investment and Financial Flows to Address Climate Change.
3 AGF (2010), Report of the Secretary-General's High-level Advisory Group on Climate Change Financing

Executive Summary

Public finance instruments (PFIs) can be used to leverage substantial private investment into low-carbon sectors in developing countries, thereby addressing a key challenge in the effort to combat the causes and impacts of climate change. Any single financing mechanism by itself, however, will be insufficiently nuanced to meet the needs of low-carbon development in a meaningful way. This is because low-carbon markets are highly complex arenas requiring multiple finance instruments to address the distinct demands of a variety of technologies and sub-sectors. These are complex living systems, and each one is unique – which means that financing approaches must be tailored to individual country contexts. Furthermore, the required combination of financing instruments will change over time as the technologies and sectors mature, and as broader country and regulatory contexts evolve.

PFI programmes can have the most far-reaching impact when they are designed in partnership with the countries considered in this study. Financing will be most effective, moreover, when delivered under a programmatic framework dedicated to low-carbon development holistically – as opposed to targeting only specific sub-sectors (such as Energy Efficiency-EE or Renewable Energy-RE) without maintaining a broader perspective on the complete overarching picture of a country's carbon intensity path. Indeed, a variety of public finance strategies have been employed in recent decades to leverage private finance into low-carbon sectors, and the most successful experiences to date are broadly correlated with a nuanced, tailored, programmatic approach.

The following principles should therefore inform the design of public finance strategy:

1. Employing a package of financing instruments is more appropriate than limiting the approach to a single financing mechanism, and distinct finance packages will need to be employed for every country considered in this study so that each one can be tailored to the specific national context.
2. Finance packages should be designed by programme managers based locally in the target countries themselves, and strategic planning should be pursued as a joint effort between programme managers and relevant local stakeholders.
3. Financing should be delivered under comprehensive low-carbon development programmes. These programmes should seek holistic and nuanced solutions that are in the genuine best interest of the countries considered in this study themselves.
4. Flexibility must be built into the programme design so that financing strategies can be modified appropriately as country conditions evolve. Impact assessment and a rigorous comparison of goals and outcomes must also be allowed to dictate adjustments to the financing strategies as needed over time.

These recommendations can be applied either to the establishment of new PFIs, or to the modification of existing PFIs.

Options for PFI engagement

Existing PFIs are best utilised by placing them within a country-based programmatic framework, or by modifying them where appropriate to more closely reflect this approach. For example, an instrument that does not currently engage local partners in strategic planning could be modified to give greater responsibility for financing strategy to local stakeholders. Similarly, a narrow financing instrument can be enhanced by adding a local low-carbon "diagnostic" facility that would locate the instrument within a tailored and comprehensive low-carbon development assessment for each country. Both of these modifications would be relevant, for instance, in the case of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), German Develoment Bank (KfW) Global Climate Partnership Fund (GCPF).

The establishment of new PFIs may be appropriate in every country that does not yet have a tailored national financing programme dedicated explicitly and comprehensively to low-carbon development. New PFI programmes could take the form of National Centres for Low-carbon Finance, each of which would employ a distinct package of instruments carefully tailored to local context, and would partner with local stakeholders on the design of financing strategy. Linking the programmes with Nationally Appropriate Mitigation Actions (NAMAs) that are already being developed by the countries considered in this study would strengthen the local participatory element of the approach while simultaneously helping these countries meet their commitments under the United Nations Framework Convention on Climate Change (UNFCCC).

Aside from leveraging private finance into low-carbon sectors, these National Centres would further add value by mandating, for the first time, a comprehensive focus on the goal of low-carbon development within the given country – which is a critical first step towards a low-carbon path. The Centres would also bring together the best local knowledge, experience and expertise in low-carbon

finance to enhance the impact of the financing programmes and the absorptive capacity of the country.

The Centres could be capitalised, either partly or fully, as national sub-funds underneath an Umbrella Fund structure that would maintain both the flexibility of design at the country level and the local strategic partnership element, but would otherwise be similar to the European Fund for Southeast Europe (EFSE). The main advantage of an Umbrella Fund structure is that it would enhance overall leveraging potential by attracting private commercial participation at the broadest funding level, while also engaging the private sector through local activities within the target markets.

The contexts of the countries under study

The activities of return-driven low-carbon investors in the seven countries under this study are currently hampered by a range of risks and constraints across the strategic, operational, financial, political and physical arenas. Specific constraints that emerged prominently in interviews with local investors include lack of equity financing; currency risk; commercial risk of power purchase agreements; limitations in loan tenor; lack of sufficient deal flow; lack of adequate policy frameworks; and limitations in knowledge and capacity among relevant players.

None of the countries considered in this study currently has a PFI programme dedicated to low-carbon development comprehensively (although there are plans to establish one in India). However, the countries considered in this study do exhibit a range of experience with PFIs targeting specific low-carbon sectors such as RE, EE, or rainforest protection – outside the context of a comprehensive low-carbon framework. India and Brazil exhibit the largest range of these more targeted PFIs, reflecting their high level of national clean energy ambitions and large domestic markets. Thailand and Morocco are mid-sized markets with enough relevant policy commitment to support a modest level of existing PFI activity. Costa Rica is a small country with a low level of PFI activity, but it has nevertheless begun to explore methods for assisting the creation of low-carbon businesses, which reflects its long history of progressive policies and a strong commitment to RE.

Vietnam and Namibia have the least amount of PFI experience and the least low-carbon policy ambition among the countries considered in this study. Whereas Namibia is disadvantaged by a small domestic market, Vietnam is comparable in size to Thailand. However, both countries lack clear policy frameworks to incentivise low-carbon development. This implies that neither country currently offers meaningful opportunities to leverage private investment into low-carbon sectors. PFI engagement in these countries is therefore not advised.

Tailoring PFIs to the countries considered in this study

For the other five study-countries, a common objective of national programmes should be to redirect financing that is already present in these countries away from high-carbon sectors and towards low-carbon sectors. This can involve a suite of instruments, including financial risk management products, political risk insurance and other credit enhancements. Programmes should also emphasise Technical Assistance (TA) and capacity building, and should align where possible with local policy priorities – such as increasing employment or energy access - in order to secure local government support and engagement. The programmes should furthermore seek to grow a network of partners and stakeholders, and to channel funds where possible through local FIs, in order to increase learning, knowledge transfer, and absorptive capacity among local actors.

When choosing specific technologies to support, the programmes should adopt a portfolio approach that takes care to avoid creating path dependency on a particular set of technologies while ignoring others that may someday prove to have significant long-term potential. In general, there is also a strong rationale to support both the earlier stages of technology innovation and demonstration, as well as the later stages of technology commercialisation, deployment, and market diffusion in developing countries.

PFI engagement has the potential to leverage private sector investment so long as it addresses one or more existing investment barriers. In principle, guarantees can leverage private finance per unit of public money spent better than either grants or direct loans. Guarantees are most appropriate in financial markets where borrowing costs are reasonably low and where a good number of Commercial Financial Institutions (CFIs) are interested in the targeted market segment – as is the case in Morocco, Thailand, India and Costa Rica. Brazil may also become a good candidate for guarantees in the future as its borrowing costs start to decrease in response to recent achievements in combating inflation.

1 Designing a Public Finance Strategy

This section builds the framework for designing a low-carbon public finance strategy. It seeks first to establish the nature of the challenge at hand, and then to draw strategic conclusions based on the particular demands of this craft and on historical experiences in this field.

1.1 Why a single financing instrument is not enough

Economies, like human bodies, are complex living systems. They have distinct yet highly interconnected systems for transport, power, communications, law enforcement, national defence, taxation and so on that must operate properly and in balance for the body to function as a whole. Within an economy, the low-carbon sectors are characterised by additional dimensions of complexity. These markets often consist of large numbers of small, dispersed projects with relatively high transaction costs for investment preparation and financing. Low-carbon energy supply involves the combined use of a variety of technologies (e.g. solar, wind, geothermal, hydropower and biofuels), as does energy efficiency. Different technologies are at different stages of development; on-shore wind is commercially operating, for example, whereas advanced solar is still in development.

The financing approaches needed to unlock a given technology depend on its current level of maturity, along with other factors, such as the characteristics of the target market segment and the broader country conditions – including the macro-economy, institutional structures and the maturity of the financial system.[4] Financing for low-carbon sectors unrelated to energy, such as rainforest protection and reforestation, requires yet other strategic frameworks. Moreover, developing countries require PFIs to be used on an even larger scale and through a greater variety of instruments, because low-carbon markets in these countries face more risks, barriers, and financing gaps needing to be addressed.

For the public finance strategist, this means that **employing a package of financing instruments is more likely to be effective** than limiting the approach to a single mechanism. Aside from being insufficiently nuanced to meet the holistic financing needs of these complex systems, individual instruments do not in themselves constitute low-carbon development strategies.

Low-carbon development is its own science. It is distinct from renewable energy, energy efficiency, reforestation, or any other specific sector that does not explicitly share its overarching goal. A solar loan programme has the potential, in theory, to help reduce the carbon footprint of any country; but this might not be the best approach to low-carbon development for a given country context (such as in the case of a country where carbon emissions mainly result from deforestation). Public finance can only be truly effective, therefore, when delivered **under a comprehensive framework dedicated explicitly to low-carbon development**.

Moreover, low-carbon markets are young and dynamic, changing over time as the sectors mature, as relevant policy frameworks evolve, and as the economic body itself develops. The public finance approach must also be suited to the growth and relationship dynamics that characterise living systems. In this regard, clinical medicine offers important lessons that can be applied to the challenge.[5]

1.2 Facing the complexities of a living system

Like human bodies, every economic system is unique – and health in each case is inescapably a question of individual conditions. Local context therefore holds the key to unlocking the right financing prescription for a given country. For this reason, the starting point for public finance strategy is differential diagnosis for each "patient" (country under study).

The public finance practitioner must be trained to hone in effectively on the key underlying constraints on low-carbon development in a unique system and to prescribe solutions that are specifically tailored to these conditions. No two economies are alike, even when showing the same symptoms of distress, and no single public finance package will be equally fitting for all. This means that **a distinct finance package will need to be employed for every country under study** so that each one can be tailored to the national context. For the seven countries considered in this study, this implies seven separate financing packages.

Public finance strategists must be steeped in the history, ethnography, politics and economics of the country where a programme is active. Just as the doctor builds a trusting, consensual working relationship with the patient, so should the public finance practitioner seek agreement from relevant local stakeholders on financing strategy. For

4 For a more detailed discussion of how to choose the financing strategy based on these characteristics, see UNEP SEFI 2009.

5 Leading development economist Jeffrey Sachs has made this argument for development policy in general. See J. Sachs, The End of Poverty (2005).

this reason, the financing packages **should be designed by programme managers based locally in the study-countries themselves**.

Upon prescribing a tailored remedy or package of remedies, the doctor would then monitor progress and modify the prescriptions over time as needed, fully responsive to the reality of the patient's condition and to his or her reactions at any given time. In low-carbon development, changes in country conditions must likewise be carefully monitored over time, and these changes should lead to corresponding modification of the financing strategy as appropriate. It is therefore important to **build flexibility into programme design**.

Since all components of an economy – like the human body – are intrinsically connected, an intervention in one area can have a cascade of impacts in others; and a failure in one area can lead to cascading failures throughout. Poverty and instability serve to compound the challenges inherent in systemic complexity; the less developed a country, the more challenges can be expected in all areas, given their interconnectedness. Public finance interventions, therefore, should only be introduced in the context of a profound commitment to search for the answers that are in the genuine best interest of the target country itself.

1.3 Learning from the past

Superficial approaches that prescribe standard finance interventions without regard to local context are wasteful at best, and can cause unintended damage at worst. The development community learned this the hard way during the 1980s from a number of painful experiences associated with the so-called "Washington Consensus" (or "Structural Readjustment", and "Shock Therapy") policy period, during which standard packages of policy prescriptions – including difficult austerity measures – were introduced in countries with what critics saw as insufficient consideration for local context. For a doctor, this would be like prescribing the same drugs to every patient without regard for individual conditions. Aside from being ineffective, it would also be dangerous and a violation of ethical protocols. The same logic applies in climate finance.

A variety of public finance strategies have been employed in recent decades to leverage private finance into low-carbon sectors. The majority of these are or were quite specific, promoting one technology in a particular region, one finance instrument to one actor (e.g. credit line to a financial institution), or one instrument at a specific stage (e.g. seed finance for rural green enterprise). Many such instruments are already active in the countries considered in this study. While these instruments have not been controversial overall, narrow financing approaches are nevertheless inadequate for addressing the demands of low-carbon development. The reasons for this have already been explained.

Indeed, **the most successful past experiences in public finance are broadly correlated with a more holistic and nuanced approach**. The UK Carbon Trust, for example, is widely hailed as a leader in this field. Its approach is tailored, flexible and programmatic, employing multiple financing mechanisms that are designed in partnership with other national stakeholders. Such nuanced financing programmes are relatively rare, particularly if the search is limited to those that explicitly adopt low-carbon development as the overarching goal.

However, nuanced programmatic approaches can be found targeting specific low-carbon sectors in developing countries. The CORFO Renewable Energy Centre in Chile and the China Energy Conservation and Investment Corporation (CECIC) are leading examples. In the countries considered in this study, no such programmes yet exist that are explicitly dedicated to low-carbon development, although one is planned for establishment in India. There are, however, programmatic approaches targeting certain specific low-carbon sectors in these countries.

The most successful public finance programmes place particular emphasis on monitoring and evaluation, and especially a rigorous comparison of goals and outcomes. Good public finance practitioners perpetually question their own conclusions. Like scientists, they should always be prepared to revise the approach according to the best emerging information and research. **Impact assessment is therefore a critical component of public finance strategy.**

However, impact assessment for low-carbon public finance programmes is a challenging arena. No group has yet produced a comprehensive set of recommendations, statement of principles, or standardisation of these methodologies (and tackling this problem could therefore be a valuable contribution to the field). BASE, on behalf of the Sustainable Energy Finance Alliance of the United Nations Environment Programme, performed a review of the impact assessment methodologies utilised by SEF Alliance member organisations in 2008. Within that context, the most advanced frameworks were found to be those of Sustainable Development Technology Canada and the

UK Carbon Trust. These models could be used to inform this aspect of programme design.

Finally, decades of development policy experience have provided another key insight: namely, that development strategy is best designed in the context of an equal partnership between donor and recipient. The goal is to create lasting change that will be learned and embraced by the target country itself, thereby enabling the donor to exit later on. This requires active participation (beyond simple agreement) by the target country in the actual design of programmes. **Strategic planning should therefore be pursued as a joint effort between programme managers and relevant local partners.**

1.4 A programmatic, country-based approach

The following conclusions can now inform the design of a public finance strategy for the seven countries considered in this study:

1. Employing a package of financing instruments is more appropriate than limiting the approach to a single financing mechanism, and distinct finance packages will need to be employed for every target country so that each one can be tailored to the specific national context.
2. The finance packages should be designed by programme managers based locally in the study-countries themselves, and strategic planning should be pursued as joint effort between programme managers and relevant local stakeholders.
3. Financing should be delivered under comprehensive low-carbon development programmes. These programmes should seek holistic and nuanced solutions that are in the genuine best interest of the study-countries themselves.
4. Flexibility must be built into the programme design so that financing strategies can be modified appropriately as country conditions change over time. Impact assessment and a rigorous comparison of goals and outcomes must also be allowed to dictate adjustments to the financing strategies as needed.

Having established some guidelines for the PFI approach, a subsequent decision facing the strategist is whether to create new PFIs, or to modify existing ones. The recommendations above could be applied in either case, and both options will therefore be considered here.

The establishment of new PFIs would be justified in any country that does not yet have a tailored national PFI programme explicitly dedicated to low-carbon development. This is the case in all of the study-countries except India. In India, a Low-carbon Innovation Centre is planned for establishment by the World Bank and the UK Department for International Development (DFID). This effort is already aligned with the recommendations listed above, indicating a rationale to join forces with the World Bank and DFID in India rather than duplicate efforts. **In the other six countries considered in this study, however, the establishment of new PFI programmes could be considered.**

Alternatively, modification or adaptation of an existing PFI would be justified when the PFI in question does not yet meet the criteria listed above. This option will be discussed in relation to the Global Climate Partnership Fund (GCPF), the Global Energy Transfer Feed in Tariffs (GET FiT) programme, and the concept of Advance Market Commitments (AMC).

1.4.1 National centres for low-carbon finance

The establishment of national financing programmes dedicated to low-carbon development comprehensively (as opposed to focusing only on specific low-carbon sectors without a comprehensive framework) would be a significant contribution to the public finance landscape in any country where this does not yet exist. **These could take the form of National Centres for Low-carbon Finance.** In line with the recommendations listed earlier, each Centre would employ a distinct package of financing instruments carefully tailored to national context, and the financing strategy would be designed in partnership with relevant local actors. The approach should be flexible and responsive to changes in country conditions and to rigorous assessment of programme outcomes over time.

National Centres for Low-carbon Finance would add value in a number of ways. Aside from providing targeted public funding to leverage private finance into low-carbon sectors, the Centres would also mandate, for the first time (except for India), an explicit focus on the goal of low-carbon development within these countries. As explained earlier, low-carbon development is its own science. Without a mandate to pursue this goal, the job can at best be done only in a haphazard way, if at all. By applying the science of this unique craft to the countries, considered in this study the Centres would help them take a critical first step towards a low-carbon development path.

Moreover, creating Centres for Low-carbon Finance would mean bringing together the best knowledge, experience and expertise of low-carbon finance that exists within the study-country. This would allow business intelligence from investors and the market to inform early-stage technology support and project selection, as well as allowing, conversely, a deep understanding of early-stage technologies to be fed back to the market – enabling early sight of new opportunities and thereby catalysing private sector investment. Collecting, networking and coordinating the best local knowledge and efforts under a national low-carbon framework would enhance both the impact of the financing programmes, and the absorptive capacity of that country.

1.4.3 The umbrella fund option

The Centres for Low-Carbon Finance could be capitalised, either partly or fully, as national sub-funds underneath an umbrella fund that would be similar to the European Fund for Southeast Europe (EFSE)[6], based in Luxembourg. However, the umbrella fund structure in this case would differ from the EFSE in that it would maintain both the flexibility of design at the country level (including various types of financing), and the donor-country partnership element. As with the EFSE, the national sub-funds would be cross-collateralised so that any loss in one would affect all the sub-funds, and the effects on shares would only be calculated on aggregated fund level.

The main advantage of an umbrella fund structure is that it would enhance the overall leveraging potential of the PFI approach by attracting private commercial engagement at the broadest funding level, while each sub-fund achieved further leverage through its local activities within the target market.

1.4.4 Working with NAMAs

Nationally Appropriate Mitigation Actions (NAMAs) are tailored strategies for reducing greenhouse gas emissions designed directly by and for developing countries themselves. Given the importance of local participation in the design of public finance strategies, **partnering with NAMAs represents an opportunity to enhance the effectiveness of these programmes.**

NAMAs were recognised within the Bali Action Plan (2007) and the Copenhagen Accords (2009) of the UNFCCC negotiations process. NAMAs are dependent on technology, finance and capacity building support provided by developed countries, which represents a potential win-win for prospective international public finance engagement. Linking public finance strategy with NAMAs that are already being developed by the countries considered in this study can strengthen the local participatory element of the finance programme while simultaneously helping the target country meet its commitments under the UNFCCC.

Generally, three types of NAMAs are differentiated: (i) unilateral NAMAs, which are domestically funded and unilaterally implemented; (ii) supported NAMAs, which are implemented with financial, technological and/or capacity building support from developed countries; and (iii) credited NAMAs, which are implemented with funding from carbon offset credits generated for the amount of emission reductions achieved. Partnering with an international public finance programme would be appropriate in the second model (supported NAMAs).

1.5 Modifying or utilising existing instruments

This section compares the programmatic, country-based approach to three public finance initiatives at the forefront of the field today. It also considers how these initiatives could be modified to be more aligned with the programmatic approach, or utilised within a programme.

1.5.1 Global Climate Partnership Fund

The Global Climate Partnership Fund (GCPF) was created in December 2009 with funds from BMU, channelled through KfW, to promote EE and RE investment in transition and developing countries. Although the fund is global, it is currently focuses on a limited number of countries, four of which overlap with the countries considered in this study – namely Brazil, India, Morocco and Vietnam. The GCPF mainly provides medium to long-term financing to financial institutions (FIs), and to a limited extent may also directly invest into projects or energy service companies (ESCOs) via loans or equity. It is accompanied by a Technical Assistance Facility helping FIs to implement the loans properly and monitor the impact.

6 EFSE is a successful fund concept that is well known to the BMZ (BMZ has invested into the fund). The main characteristics are similar to the proposed fund structure (section 6), with some modifications regarding the cross-collateralisation of shares and the proposed waterfall structure. The EFSE structure provides a good blueprint for a global fund that wants to invest in different countries.

The GCPF exhibits many features that are aligned with the approach recommended here – such as the public-private partnership structure, the accompanying TA component, and the emphasis (70%) on financing through local institutions are excellent characteristics of the fund. A drawback of this fund is that it does not seek out, nor explicitly respond to, the "whole truth" of a target country's low-carbon development situation. In the analogy to clinical medicine, the GCPF is like a drug targeting two important areas of low-carbon "health" (EE and RE). However, like any drug, this tool should ideally be applied within the context of an overarching "prognosis" (comprehensive low-carbon framework) for each target country.

Another drawback of the GCPF is that, although it seeks to channel funding through local institutions, the financing strategy itself is already pre-defined. As explained earlier, the countries considered in this study should ideally participate in the design of financing strategy. In this case, they have no say in the matter and therefore less chance to establish a sense of ownership over the financing approach. This weakens the potential to support lasting change in the modalities of local leadership, as well as local replication of the strategy.

Options for enhancing the GCPF, therefore, could be to:

1. Place this tool within a programmatic framework providing a country-specific, low-carbon "diagnostic" function. This can be considered a form of Technical Assistance directed at the financing strategists themselves.
2. Modify the approach so that local partners are directly involved in designing the financing strategy.

1.5.2 Advanced Market Commitments

The Advanced Market Commitments (AMC) is an approach that combines market-based financing tools with public intervention. The AMC has been applied to vaccine markets in recent years and has proven to be a powerful tool for dealing with market failures in this context. Many donors are therefore asking whether the AMC would work in climate finance.[7]

An AMC is a binding contract, typically offered by a government or other financial entity, used to guarantee a viable market if a product or technology is successfully developed. The effect of the AMC is to guarantee a price for a specific product, thereby acting as a "pull mechanism" that seeks to create a sustainable market by subsidising demand for that product. In designing an AMC, the specific product, market, industry and policy context matter. AMCs are complex financing structures that must be tailored to the specific challenge at hand. It makes little sense, therefore, to transplant the original AMC structure into the climate field directly. Rather, donors should look at the challenges in financing a given climate project, and design an innovative financing scheme that fits them. Moreover, AMCs must be designed at the country level and cannot be transplanted from one country context to another.

This can be an useful tool for accelerating the development of specific low-carbon technologies, but – like the GCPF – is not a comprehensive strategy in itself. AMCs are a promising financing option, but they should be placed *within* a country-based programmatic framework.

1.5.3 GET FiT

The GET FiT (Global Energy Transfer Feed-in Tariffs) programme, put forward in April 2010, is an initiative championed by Deutsche Bank Group to help facilitate the installation of Feed-in Tariffs in developing countries. GET FiT looks to combine public financing with the experience of national and international partners to help address project development and remove financing barriers in developing countries. It aims to establish the "incremental costs" to an economy, taking into account the energy-industry benefits of fuel diversification; reduced fuel imported dependence and increased national employment. A number of national finance sources and instruments cover the difference between the national value of RE production and the cost of conventional energy; international carbon finance pays for the remaining, true "incremental cost". The international community receives value for climate money, and the recipient country receives carbon finance at far lower transaction costs than under the Clean Development Mechanism (CDM)-approach.

This initiative provides an excellent example for how to establish a mutually meaningful collaboration between donor and recipient countries. The strategic partnership and tailored "diagnostic" aspects of GET FiT are well

7 See, for example: Climate Change Capital, Advance Market Commitments/Emission Reduction Underwriting Mechanisms for Climate Change Finance, July 2010: http://www.climatechangecapital.com/media/111307/advance%20market%20commitments%20july%202010.pdf

aligned with the PFI approach recommended here. Like the GCPF, however, this is a single instrument rather than a comprehensive low-carbon development strategy.

Like AMCs, the GET FiT approach could be an excellent tool to use within a country-based programmatic framework, where this fits the local "prognosis". It is most appropriate for countries with a medium market potential, yet with green growth ambitions. Among the countries considered in this study, this option is thus most feasible to develop for Morocco, and potentially also Thailand.

Global Energy Transfer Feed-in Tariffs (GET FiT)

Concept: to support renewable energy scale-up and energy access in the developing world through the creation of new international Public-private Partnerships.

Primary goal: to financially support renewable energy policies that reduce or mitigate investment risks, and consequently attract significant private capital in order to drive markets for commercially-available technologies. Such policies should include:

* The use of advanced feed-in tariff designs
* PPA as pre-FiT regulatory mechanism
* The adaptation of FiT design principles

Secondary goal 1: to work with national and international partners to address a variety of risks and barriers faced by project developers, investors, and financers, including development risk, off-take and counterparty risks, political risk, market risk, reinsurance risk and currency risk.

Secondary goal 2: to aggregate and to coordinate existing resources in the energy sector and to directly involve domestic players in the Program's management and transactions. In addition, the Program would help source technical assistance and capacity building, with focus on:

* Advance feed-in tariff design
* Grid capacity and expansion cost analyses, resource assessments, project feasibility studies, and integrated energy planning processes for governments and governments' agencies.
* Grid management and RE integration strategies for utilities.
* Financial due diligence and risk mitigation strategies for local financers.
* RE project development.

Main characteristics of the Program:

* GET FiT concept is intended to be a flexible, but detailed, program design that could be managed and funded through a number of different existing and/or new channels.
* Issues like governance structure and capitalization strategies (e.g. fast start funds, international carbon markets, national donor strategies, bonds, etc.) will be addressed during the Program's implementation.
* The GET FiT Program might be conceivable as a template for parties seeking similar goals.
* This Program could be implemented in phases, with initial phase prioritizing near-term bi-lateral or regional implementation opportunities.

2 Tailoring Programmes to the Contexts of the Countries under Study

The previous section concluded that distinct packages of PFIs would need to be designed for each of the countries considered in this study so that these can be tailored to the specific national contexts. This section explores key factors that will shape the design of the financing packages for each of the countries considered in this study.

2.1 Existing risks and constraints

PFIs leverage private finance by targeting existing risks and constraints on investment.[8] In general, low-carbon investors currently experience a wide range of risks and constraints. A broad categorisation of these risks is summarised in Table 1 below.

In developing countries, low-carbon investment conditions are characterised in general by higher levels of risk aversion among financial institutions; higher borrowing costs; lack of access to loans with tenor longer than 5-6 years, less experience with project finance structures and high requirements for equity co-finance (typically 40%); lack of angel and venture capital (business finance) for start-up SMEs, higher foreign exchange risks when sourcing international funds; greater market risk due to less stable macroeconomic conditions; limited equipment operations and maintenance expertise; and a greater need for technology transfer support.

Table 1: Basic categorisation of risks

Category	Factors	Mitigation Instruments
Strategic	Technological change, shifting consumer preferences, or other events that negatively impact the performance of market players	Adequate PPAs Legal obligations Capacity building & TA
Operational	Interruption of service due to system errors or defects	Insurances
Financial	Financial loss due to interest rate movements, currency fluctuations, oil price volatility, input cost changes, counterparty credit issues and decommissioning costs	Financing equity Senior loan equity Mezzanine
Political	Changes in the political or regulatory landscape that may harm performance of technologies, especially with regard to the policy framework that delivers a carbon price or revenue support mechanism	Feed-in tariffs Obligations
Legal	No respect of property right, land tenure, weak law enforcement	Strengthening the legal system, guarantee scheme
Technical	Weak equipment quality, lack of turnkey and O&M suppliers	Insurance, improve supplier infrastructure
External	Financial loss due to adverse weather events, resource shortage	Weather derivates, insurances

Own source

8 For the RE sector in particular, risks to private investment have been examined in-depth in a number of recent studies. For example: UNEP SEFI, *Financial Risk Management Instruments for Renewable Energy Projects,* 2004; UNEP DTIE, *Financing Mechanisms and Public/Private Risk Sharing Instruments for Financing Small Scale Renewable Energy Equipment and Projects*, 2007; UNEP and Marsh Ltd., *Assessment of Financial Risk Management Instruments for Renewable Energy Projects*, 2007.

2.1.1 Key constraints in the countries considered in this study

This section provides an overview of the main risks and constraints that emerged from background research of the countries considered in this study and from interviews with local and international i) investors, ii) financing institutions (commercial and development-oriented), and iii) project developers active in these countries. These barriers are evident to varying degrees in all of the countries considered in this study; however, a detailed listing of country-specific interview results is included as Annex E.

A persistent constraint on debt financing for low-carbon projects that emerged in all of the countries considered in this study is the inability of project developers to secure sufficient **equity financing.** The reasons are both lack of capacity to design financially sound projects, and equity availabity. Lending to project developers or projects directly in developing and emerging markets typically requires a higher proportion of equity relative to debt than would be the case for similar projects in mature markets.

Currency risk is another key constraint. Exchange rate fluctuations restrict foreign private sector engagement because assets with stable and predictable returns in their local currency are much more volatile when converted to the currency of the investor, significantly increasing the risk of the investment. Although financial instruments to hedge this risk are already available for commonly traded currencies, the private sector appears unwilling to provide the same instrument for currencies traded less frequently.

Commercial risk of Power Purchase Agreements (PPAs) for renewable energy was frequently mentioned by experts as another significant barrier to investment in low-carbon sectors. PPAs establish a complex relationship between the seller (generally the developer of the renewable energy source) and the buyer (often a utility), including key provisions addressing allocation of future risks that are inherent in long-term renewable energy contracts. PPAs have a wide range of risk exposures and some tend to be very complex. Through various PPA terms, utilities seek to place the risks on the renewable project developer, which can result in PPA terms that are very problematic for project financing.

Loan tenor furthermore emerged as a common theme in these discussions and in the background research. Indeed, long-term loans are required to finance low-carbon infrastructure projects that often have a payback period of longer than 7 years. However, in emerging and developing countries, debt financing is in many cases not available for more than 5 years. Debt providers are hesitant or unable to provide long-term loans when country conditions are not stable or financial conditions are constrained. Raising longer-term debt to cover the duration of low-carbon projects in these countries can therefore be extremely difficult.

A further common preclusion to private sector engagement is insufficient **deal flow.** It is not always the case that there is an unwillingness to provide capital for low-carbon projects in the developing world, but rather that there is a shortage of sufficiently commercially attractive, easily executable deals in which to deploy capital.

Finally, experts in all the countries considered in thhis study identified **limitations in knowledge and capacity** among relevant actors as a significant constraint on investment. This applies to project developers, financing authorities, and public administrators. Bankers often do not understand the technologies being used in low-carbon projects and are unwilling to approve financing due to an inability to assess the risk of the project. Similarly, lack of understanding "carbon finance" means inability to recognise potential CDM investments. Project developers require support in business and financial planning, technical expertise, or basic information to be able to apply for project funding. Public administrators often lack capacity to streamline approval processes effectively. Where supportive laws for low-carbon sectors have been passed, public administrators often lack the capacity to implement the laws, rendering them ineffective at facilitating investment.

Most low-carbon technologies are still relatively high cost when compared with conventional high-carbon options if environmental and other externalities are not factored in. For this reason, credible policy support is especially important for generating private sector interest in low-carbon sectors, and a **lack of supportive or sufficiently stable regulatory frameworks** is a critical barrier. Among the countries considered in this study, this is especially the case in Namibia and Vietnam.

2.1.2 Differentiation among investors

It should be noted that these constraints affect different types of investors differently. Low-carbon project investments in the countries considered in this study are undertaken by three broad categories of investors:[9]

9 The definition of scale depends on the technology. In this study, scales were defined according to installed power capacity rather than investment volume.

- Professional foreign investors, mainly large-scale projects of more than 20MW;
- Professional national investors in medium-scale projects (10-20MW), but also some larger scale;
- National start-up project developers of small or medium-scale projects (usually less than 10-20 MW, often down to as low as 500 kW).

Foreign investors are generally private equity firms, insurance companies, pension funds, industry bodies, foreign clean energy companies and Development Financial Institutions (DFIs). While DFIs include market development as well as economic and social impact in their strategy, private investors primarily look for minimum returns, i.e. around 25% Internal Rate of Return (IRR). The key challenges for them are regulatory-backed financial inflows, foreign currency finance for investments with operating revenue paid in local currency and country-specific risks.

We find similar profiles for **professional national investors**. Many successful local businesses, and not only from the energy sector, are actively looking for potential deals in the low carbon market. They generally face fewer problems to secure equity for their investments, to be considered credit-worthy, or to secure finance on a non-recourse basis. However, they often face problems in securing domestic funding in local currency with sufficiently long tenor. In spite of this, there is a growing appetite to invest in low carbon projects from local pension funds and insurance companies. This is the case in India, Brazil and Morocco. In addition, some commercial financial institutions are already active in the low carbon market and many others may enter the market soon.

By contrast, most **start-up project developers** face problems both in meeting lender expectations for equity participation and in securing debt finance. They do not enjoy a track record with banking institutions, and hence are viewed as bad credit risks. Banks therefore are generally unwilling to provide them with non-recourse finance or loans on terms longer than 5-7 years. This problem persists in spite of the fact that several of the countries considered in this study help small and medium project developers by offering technology-specific feed-in-tariffs (available for projects with less than 10-20 MW capacity).

Similarly, financing constraints can be differentiated according to the target market segment. For example, a summary of gaps and barriers associated with clean energy projects according to their market segment is shown in Table 2 below.

Table 2: Gaps and barriers associated with financing clean energy projects

Market segment	Gaps and barriers
Large scale grid-connected RE and industrial EE projects	* Lack of project sponsor equity * Lack of long-term local currency financing options * Foreign exchange risks for foreign currency loans * Local currency risk (inflation, interest rate) * Lack of appropriate instruments to manage commercial and political risks * High transaction costs and timing uncertainties
Medium, small and micro-scale RE and EE	* Lack of early-stage seed capital * Lack of appropriate financial intermediaries * Lack of patient and growth capital * Lack of end-user finance * High transaction costs and timing uncertainties

Own source

2.2 Existing PFIs in the countries considered in this study

Effective design of PFI programmes requires an awareness of the existing PFI landscape. The main categories of low-carbon PFIs that currently exist in the countries considered in this study include:

- **Credit lines** to local commercial finance institutions (CFIs) for senior and mezzanine debt to projects;
- **Debt financing** of projects by entities other than CFIs;
- **Loan softening** programmes to mobilise private sources of capital;
- **Guarantees** to share the commercial risk of lending to projects and companies, to end-users, and to SME start-ups;
- **Grants** and **contingent grants** to share project development costs;
- **Equity funds** and **quasi-equity** investing risk capital in companies and projects;
- **Venture capital funds** investing risk capital in technology innovations;
- **Carbon finance** facilities that monetise the advanced sale of emissions reductions to finance project investment costs; and
- **Technical assistance** to build the capacity of all actors along the financing chain.

A detailed listing and descriptions of specific instruments in each of the countries considered in this study can be found in the background document that accompanies this report. A summary table is included as Annex A.

Among these countries, only India and Brazil have implemented a large and sophisticated range of PFIs stimulating the creation of national low-carbon businesses (particularly in RE/EE), including national content requirements for investments seeking access to PFIs. They are also the only countries considered in this study that are developing policies and investment programs for technologies that do not belong to the "low-hanging-fruit" category. India, in particular, has introduced an especially broad range of PFIs to stimulate investments in RE. Both countries also have a very open eye for the export potential of low-carbon technology.

Thailand, Morocco and Costa Rica are in the mid-range of existing PFI activity among the countries considered in this study. Although far below the level of India and Brazil, they have nevertheless begun to explore methods for assisting the creation of RE/EE businesses. Thailand has succeeded in setting up some PV-manufacturing plants, and Morocco's 2000 MW CSP-plan may lead to some follow-up in terms of promotion of component manufacturing. Costa Rica is a small country but with a long history of progressive policies, and it is implementing 100% RE in new power capacity.

Vietnam and Namibia are at the low end of the scale in terms of existing PFI activity. These countries have small national markets for RE&EE technologies and, as a consequence, have not yet developed initiatives to link PFIs fomenting investments in RE&EE-projects with PFIs fomenting investments in RE&EE businesses.

Table 3: Comparative PFI activity in the countries considered in this study

level	country
High level	India Brazil
Mid range	Thailand Morocco Costa Rica
Low level	Vietnam Namibia

Own source

The main explanation for the variation in the level of existing PFI activity within the countries considered in this study is their corresponding variation in country size (in terms of population and GDP). The development of low-carbon sectors depends on the development of a national market for the technologies. India and Brazil are the only countries considered in this study large enough to have significant domestic markets for low-carbon technologies – which offers the opportunity for active industrial policy in favour of creating national low-carbon businesses.

In all seven countries, the energy sectors in general and the power sectors in particular have been dominated by state-owned firms. Direct state enterprise investments continue to be the favoured PFI to promote investments in RE power plants in Costa Rica, Vietnam, Namibia, and Morocco. Brazil, India and Thailand rely now on the promotion of private investments in RE-power. Morocco also uses public funds to buy shares in start-up RE&EE businesses. In terms of end-user finance for low carbon products and technologies (e.g. micro-loans for farmers to purchase biogas installations), the clear trend is for PFIs promoting these investments to be given as part of integrated programmes – not as individual specific PFI instruments.

2.3 Selection and design of new PFIs

Selection and design of the most appropriate PFIs requires the evaluation of (i) the level of technological maturity, (ii) the characteristics of the target market segment and (iii) the country conditions, including the macro-economy, institutional structures and the maturity of the financial system.

All of the countries considered in this study have relatively well-developed financial markets in relation to the developing world as a whole. This means that a central objective for every national programme will be to **redirect financing** that is already present in these countries away from high-carbon sectors and towards low-carbon sectors. This can involve a suite of instruments, including financial risk management products, political risk insurance and other credit enhancements. Additional priority areas that are appropriate in all countries considered in this study include extending loan tenor; mitigating foreign exchange and PPA risk; and scaling up private equity-type investments, particularly seed financing and venture capital for early-stage technology development.

Other priorities will vary from country to country. In **India** and especially in **Namibia**, an important priority would be to leverage private finance for systems that provide low-carbon energy access to rural areas – for reasons explained in the next section. In financial markets with high commercial lending rates, as has been the case in **Brazil** in recent years, public funds can be used to buy down interest rates through a credit enhancement approach similar to that used by KfW to facilitate increased bank lending for energy efficiency in Germany. Alternatively, credit lines can be offered at concessional rates or structured on a limited/non-recourse basis, or offered as subordinated debt to induce borrowing and direct credit to low-carbon sectors. By taking on a higher risk position in the financial structure, this approach can leverage higher levels of commercial financing.[10]

2.3.1 Government commitment and development co-benefits

It is important to choose a strategy that appeals to the national government in each target country, given that policy and regulatory support are especially critical for low-carbon sector development. It is therefore highly advisable to consider the potential **employment and development impacts** of the various PFI options, since these are important priority areas for the target country national governments. A focus on innovation and early-stage technology development, for instance, is promising in this regard because it implies the creation of and support for local businesses that would add new high-quality employment opportunities.

Certain key differences among the countries considered in this study will play a role in determining their national low-carbon priorities – e.g. whether they would sooner concentrate efforts on decarbonising existing infrastructure or on ensuring the development of appropriate systems to provide access to low-carbon energy sources for rural areas. Table 4 ranks the countries according to factors influencing these two decisions.

Table 4: Rankings by CO_2 emissions and energy access

By % access to electricity		
1	Thailand	99.3
2	Costa Rica	99.1
3	Brazil	97.8
4	Morocco	97.0
5	Vietnam	89.0
6	India	64.5
7	Namibia	34.0
By carbon emissions (1,000s of metric tonnes*, 2007)		
1	India	1,612,362
2	Brazil	368,317
3	Vietnam	277,511
4	Thailand	111,378
5	Morocco	46,406
6	Costa Rica	8,119
7	Namibia	3,036

*Human-produced, direct emissions of carbon dioxide only. Excludes other greenhouse gases; land-use, land-use-change and forestry; and natural background flows of CO_2.

Sources: United Nations Statistics Division, MDG indicators/CO_2 emissions; IEA World Energy Outlook 2009; World Bank 'Doing Business' rankings 2010

10 It should be noted that credit lines in general have limited leverage potential relative to, for example, guarantees. However, like guarantees, credit lines can have an indirect leveraging effect in that they help local Commercial Financial Institutions (CFI) to gain experience managing a portfolio of low-carbon loans, thereby helping to overcome elevated risk perception and build local capacity for low-carbon finance.

2.3.2 Absorptive capacity

Absorptive capacity is a key issue in the countries considered in this study both in terms of developing the project pipelines and the enabling conditions needed to make them commercially viable. The public finance activities are therefore most likely to be effective if the Centres can simultaneously foster and encourage innovation and collaboration among private, academic and public-sector partners, thereby helping to ensure the dispersion of the technologies in relevant market sectors throughout the countries considered in this study. The Centres should thus work closely with and help to **grow a network of stakeholders and partners**[11] including local technology innovators, academics, entrepreneurs, investors, and public administrators – helping them to form strategic relationships and build a critical mass of low-carbon development capability. This would help draw in expertise and resources from local business and low-carbon investors (nationally and internationally) to catalyse large commercial investment in the most cost-effective low-carbon projects.

The significance of the need for **TA and capacity building** was reflected in the recurring emphasis on this point by local experts interviewed for this study. Project developers, for example, often require support in formalising business plans and preparing projects for investment, particularly in uncertain and evolving regulatory environments where timing costs and development risks are significant. Institution building (related to government ministries, universities, research institutes, businesses, and civil society) itself has a cost that must be anticipated to ensure long-term impact.

Local financing capacity can be supported in part by financing projects indirectly through local CFIs, rather than directly to project developers. The PFI programmes should therefore seek where possible to **channel funds through local CFIs**, in this way helping them gain experience in managing a portfolio of low-carbon loans, which puts them in a better position to evaluate true project risks. This helps to address the problem "elevated perception of risk" and builds the capacity of local lending authorities to target low-carbon sectors. Providing credit lines to local CFIs would thus be preferable to the option of providing loans directly to project developers. Guarantees would also have the same effect. Also, at this point the transaction costs must be taken into consideration.

11 Key prospective partners for each country are listed in Annex B.

2.3.3 Technology innovation and diffusion

The transition to a low-carbon economy will require deployment of many different types of technologies. Countries should aim to deploy a tailored mix of technologies, and to anticipate changes in the prioritisation of technologies as new innovations are developed. A **portfolio approach** should therefore be adopted, with no single technology favoured. When crafting the package of financial instruments, care should thus be taken to avoid creating path dependency on a particular set of technologies while ignoring others that may someday prove to have more significant long-term potential.

The technology development process covers research and innovation, prototype demonstration, project development and deployment, initial commercialisation, and market diffusion. Even in mature economies, a persistent funding gap arises as technologies move out of the laboratory and enter the demonstration phase, during which they must prove themselves in full-scale, real-world situations. In developing countries, there is an even greater need to use PFIs for early-stage technology development both to make up for lack of private equity providers and to compensate for imperfect and evolving policy environments.[12] However, there is also a strong rationale to accelerate commercialisation and diffusion in order to avoid carbon lock-in and ensure that developing countries are able to step onto a low-carbon development path. The PFI approach should therefore **support the entire technology development process.**

2.4 Maximising leverage potential

Research shows that PFIs can achieve a leverage ratio that can range between 3:1 and 15:1.[13] Factors affecting the leverage potential for these sectors in a given country include:

1. The level of sophistication of its financial sector;
2. The existence and effectiveness of the policy and regulatory frameworks needed to make low-carbon sectors commercially viable;
3. The size of the domestic market.

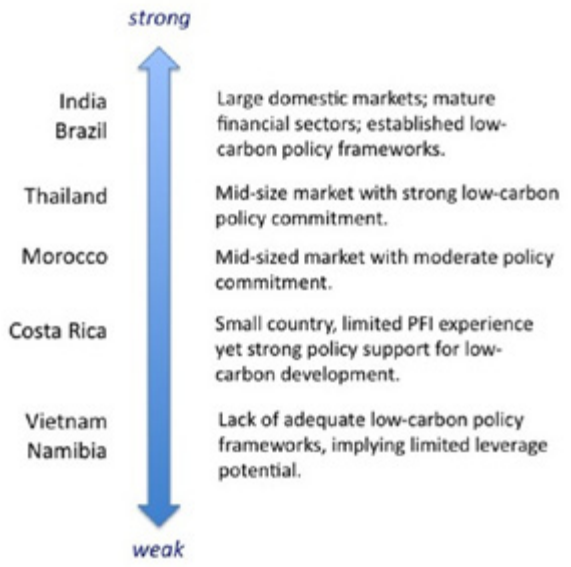
12 PFIs can be especially helpful when targeting the more costly and time-intensive project development activities such as permitting, power purchase negotiations, grid interconnection and transmission contracting.

13 UNEP SEFI, Public Finance Mechanisms to Mobilise Investment in Climate Change Mitigation, 2009.

In general, higher leveraging ratios can be achieved in sophisticated financial markets than in less developed financial markets. All of the countries considered in this study have relatively well-developed financial sectors. (Even Namibia, the least likely candidate based on market size, nevertheless has one of the most developed financial sectors in Africa.) The first criterion therefore should not be an obstacle to achieving leverage in any of these countries.

However, the same cannot be said of the second and third criteria. Without the necessary incentives to create markets for clean energy technologies, including a sufficiently high price on carbon, there is little advantage for commercial investors to engage in these sectors – even in relatively mature financial markets. This means that the potential to leverage commercial finance in a given country depends on the level and effectiveness of the existing low-carbon policy frameworks. In countries that have small domestic markets and/or no regulatory framework to support low-carbon sectors, the market for these technologies is generally too nascent for the private sector – implying little leverage potential. Among the countries considered in this study, this scenario applies in Namibia and Vietnam.

Figure 1: Relative PFI leverage potential



Own source

2.4.1 Methods for achieving leverage

A PFI approach has potential to leverage private sector investment as long as it addresses one or more of the existing investment barriers. As seen earlier, there exists a broad range of barriers, including currency risk, lack of deal flow, lack of equity, gaps in knowledge and capacity. Table 5 shows how leverage can be achieved from a range of activities. Support for early-stage technology and project development, for example, addresses lack of deal flow, leveraging private finance by moving projects to the phase where their commercial viability can then be assessed. For early-stage technology support, equity-focused PFIs that are structured as "funds of funds" (or "cornerstone funds") are most catalytic, leveraging private capital both into the funds themselves and later into the investments that the funds make.14

Table 5: Leverage potential of low-carbon interventions

Activity Type	Leverage
Applied R&D	* Direct industry co-funding
Technology accelerators	* Direct industry co-funding * Catalysed market, leading to significant commercial investment
Business incubator services	* Subsequent fundraising by supported companies as a result of incubation services (10:1 leverage potential)
Enterprise creation	* Direct industry co-investment
Early stage funding for low carbon ventures	* Co-investment by private sector funds (10:1 leverage potential) * Further catalysed market for low carbon investment through demonstrated success
Deployment of existing energy efficiency measures	* Initially free, but eventually shared cost with business * Stimulate investment by organisation receiving support
Skills/capacity building	* Leverage of partner company resources * Catalysed markets by freeing supply chain capacity constraints
National policy and market insights	* Catalysed markets by enabling development of regulatory regimes which incentivise and de-risk low carbon private sector investment

Own source

14 Grantham Research Institute et. al., Meeting the Climate Challenge, 2009.

A **risk reduction** approach would seek to leverage private finance by addressing the especially high level of both real and perceived commercial risk associated with potential low-carbon investments in developing countries. Risk reduction can be achieved by designing PFIs to take on a higher risk position in the financial structure relative to CFIs, or through publicly backed guarantees.

2.4.2 Publicly backed guarantees

In principle, **guarantees can leverage private finance per unit of public money spent better than either grants or direct loans**. This is because fees for guarantees, even when set at levels that cover the full cost of the expected future claims for loss minus expected recuperation of assets, are a fraction of the committed loan or equity capital.[15]

In the case of guarantees, leverage is usually measured in terms of (A) the total project and equipment financing accomplished through a programme, in ratio to (B) the amount of concessional funding provided. (B) refers to actual concessional funds expended in loss claims and is thus measured retrospectively, given that capital is only expended under a guarantee programme when loan losses occur.[16] In order to get an optimal guarantee level, national governments and multi-lateral organisations should play a very important role.

The degree of achievable leverage is directly connected with the guarantee percentage offered. A guarantee percentage of 50% results, mathematically, in a higher leveraging ratio than an 80% guarantee. However, if a 50% cover is insufficiently attractive for potentially interested CFIs, it will not be taken up. On the other hand, if an 80% guarantee is too risky for the guarantor, then it cannot be offered. The ratio must be placed within the comfort range of both sides.

Guarantees are appropriate in developing economies that do not lack basic liquidity for infrastructure investment, but rather lack incentives and revenue certainty needed to offset the elevated risks and initial transaction costs associated with low-carbon projects. The guarantees would be directed at CFIs who despite adequate medium to long-term liquidity are still unwilling to provide financing to low-carbon projects because of high perceived credit risk (i.e. repayment risk).

However, guarantees are only appropriate in financial markets where borrowing costs are reasonably low and where a good number of CFIs are interested in the targeted market segment.17 When these two factors are considered together, among the countries considered in this study **guarantees are most appropriate for Morocco, Thailand, India and Costa Rica**.

Guarantee schemes can be used to safeguard investments by foreign firms in the setting up of local subsidiaries, and to increase tenor of loans for professional and for start-up investors.18 Guarantees can also be used to mitigate commercial risk of PPAs, which emerged as a significant constraint on investment according to local experts interviewed. Where a key barrier to loans is demand from CFIs for collateral that the target group cannot fulfil, guarantees can be structured to reduce demand for collateral by offering a combined first order loss guarantee and a subordinated recovery guarantee.19

2.4.3 Leveraging through fractional reserve

In today's Fractional Reserve banking system, banks "create" money by leveraging their capital into loans. At an 8% capital requirement, they can leverage capital by a factor of twelve, so long as they can attract sufficient deposits (collected or borrowed) to clear the outgoing checks. By using public funds to capitalise a low-carbon development bank, or to increase the capital of an existing public bank (such as KfW), public funds themselves can be multiplied many times. This, in turn, would expand the leveraging of private finance that could be achieved through the activities of the bank.

15 The IFC has developed a guarantee structure, for example, that can achieve a leverage ratio of up to 15:1 for energy efficiency investments. IFC provides guarantees to local CFIs, which then use this risk sharing support to provide financing to various EE market segments, using multiple financial products. Over time, the guarantees can be phased out as familiarity with these sectors improves and risk perceptions decrease. When effectively structured, one unit of public funds can directly leverage 12-15 times that amount of commercial investment into EE projects and indirectly catalyse long-term growth of financial commitments to the sector. For an explanation of its structure, see p. 17 of UNEP SEFI, Public Finance Mechanisms to Mobilise Investment in Climate Change Mitigation, 2008.

16 W. Mostert et. al. on behalf of UNEP SEFI Public Finance Alliance, Publicly Backed Guarantees as Policy Instruments to Promote Clean Energy, 2010.

17 Grantham Research Institute et. al., Meeting the Climate Challenge, 2009; UNEP SEFI, Public Finance Mechanisms to Mobilise Investment in Climate Change Mitigation, 2008.

18 Guarantees for debenture issues of professional firms and with seed capital for smaller-scale project developers.

19 Detailed guidelines for the design of publicly backed guarantees can be found in: W. Mostert et. al. on behalf of UNEP SEFI Public Finance Alliance, Publicly Backed Guarantees as Policy Instruments to Promote Clean Energy, 2010.

2.5 Prioritising the countries considered in this study

When leverage is a decisive goal, then PFI engagement is most appropriate in countries where domestic markets and policy frameworks offer meaningful opportunities to incentivise private sector engagement. Given the limited leverage potential in Namibia and Vietnam explained earlier, PFI engagement in these countries is not advised. Instead, the next steps for Namibia and Vietnam could be to design low-carbon roadmaps and establish attractive regulatory frameworks.

However, PFI engagement would be appropriate in **India, Brazil, Thailand, Morocco and Costa Rica**. The next section therefore suggests specific recommendations for the establishment, structure and funding of National Low-carbon Centres under an Umbrella Fund structure, which could be appropriate for all these countries. In India, however, the effort should be merged with the planned World Bank/DFID innovation centre – as discussed in Section 1.

As a starting point, PFI engagement could begin initially in those countries with a medium market potential, yet with green growth ambitions. Among the countries considered in this study, this most closely characterises Morocco and Thailand. **Morocco is particularly interesting** because of the country's ambitions to invest in CSP-plants and in developing local manufacturing, and because of the DESERTEC initiative. This is particularly relevant for Germany considering that German CSP-technology is a world leader, yet there are no prospects for a home market; and because the EU has been unable to develop a feasible strategy and finance concept for the implementation of its Plan Mediterranné.

3 Operational Details and Implementing Capacity

This section discusses more detailed requirements and recommendations for governance, structure, funding and operation of the National Low-carbon Financing Centres and the Umbrella Fund. In general, operational success for each Centre would depend on three main factors: (i) appropriate governance that provides effective engagement and oversight while protecting the independence of Centres; (ii) funding at a scale and durability to enable Centres to invest for the long term; and (iii) tailoring the implementation strategy effectively to local needs.

3.1 Governance, operation and funding

The National Low-carbon Financing Centres would be operationally similar to the Innovation Centres that have been proposed for developing countries by the UK Carbon Trust,[20] with two main differences. The first difference is the Umbrella Fund concept, which is not a component of the Carbon Trust proposal. The second is substantive rather than operational: whereas the Carbon Trust centres would support technology innovation specifically, the Financing Centres would support low-carbon development comprehensively. Nevertheless, the experience of the Carbon Trust is highly relevant and can inform the operational design of the Centres. Its recommendations have therefore been adapted and applied to the governance and funding details that follow.

The National Low-carbon Financing Centres should be publicly funded organisations set up as Public-private Partnerships at the national level in the countries considered in this study. They would be supported by a Global Secretariat that would maintain a global perspective, agree overall plans and monitor progress, ensuring knowledge transfer across the Centres. To maximise impact, the Centres should be independent, mission-driven organisations. There must be appropriate local ownership of each Centre, with establishment of local governance and local control of project prioritisation. However, a partnership element between developed and developing countries would include agreed goals and success criteria.

The structure of each Centre would suit local conditions. As an example, a Centre could comprise an administrative group, a national strategy group and a series of in-house teams and/or third party delivery partners. An executive board would be responsible for defining the strategy, plans and budgets for the delivery of activities in each Centre, developing an organisation capable of delivering the plans, managing the delivery of the plans and monitoring and reporting on progress. The executive board could consist of equal representation from the central institution, national government and independent members such as from local business or academic communities.

The administrative group would facilitate the delivery of the various programmes and would act as a local centre of excellence for low carbon finance, engaging with public and private stakeholders as well as representing the Centre to the Secretariat. The national strategy group would be responsible for analysing and explaining the issues and opportunities around low-carbon finance locally and for providing input into the development of the Centre strategy and delivery plans, supported where necessary by the strategic and scientific advisory group in the secretariat. In-house local delivery managers would be responsible for the delivery of the activities, supported where necessary by external delivery agents.

The Centres could draw up proposals on an annual basis for approval, and objectives and targets could be agreed between the secretariat and the Centre. Objectives and targets may include a leverage target (i.e. raising of additional private and/or public sector funds), project delivery targets (number of projects started/completed across the various areas of activities), and outcome targets which could include IP generation, numbers of companies attracting further funding and carbon savings.

Public funding must be on a scale and commitment time horizon sufficient to allow planning and implementation of complex projects, including sufficient public funding to undertake pre-commercial activities. An effective collaborative relationship with government and the private sector would be needed to leverage additional funding, without compromising the ability of the Centre to provide an independent viewpoint on the policies needed to contribute to agreed goals.

One financing Centre would require funding of approximately EUR 30-70 million per year. Given the long lead times involved in low-carbon research, development and deployment of projects, a five-year funding budget would be the minimum necessary to establish local networks and achieve measurable progress. At an overall level, this would require a total investment of between EUR 1.05 billion and 2.45 billion[21] over five years to establish a

20 Carbon Trust, Low Carbon Technology Innovation and Diffusion Centres, 2008.

21 5*30*7=1.050; 5*70*7=2.450

Centre in each of the seven countries considered in this study as a first phase of activity.

Future funding for subsequent time periods should be considered in light of the success of the first phase. The Centres would seek additional funding from other public sources and would be expected to achieve additional funding from national governments. The Centres can reasonably be expected to leverage 5-10 times as much in private sector investment overall. Funding from local governments and leveraging of private sector funding would be expected to increase over time.

The size of the Centres needs to be sufficient to support a range of low-carbon projects and early-stage companies. However, this needs to be set in the context of the ability for the local market to supply the required number of projects, e.g. larger, more industrialised countries are likely to have many projects to fund. However, countries where access to energy is of primary concern may wish to concentrate their efforts on funding deployment of one or two key clean energy technologies.

The Centres would allocate funds based on prioritisation of the range of projects available to them. The Centres could enable up to 50 projects per year to be supported in each Centre, many of which could lead to self-sustaining low-carbon technologies and businesses, given appropriate policy environments, with considerable carbon and economic benefits.

3.2 Umbrella fund structure

The Local Centres for low-carbon finance and expertise can be capitalised partly or wholly as national sub-funds underneath an umbrella fund framework. Specific recommendations for the design of such a system follow.

3.2.1 Legal structure and regulatory framework

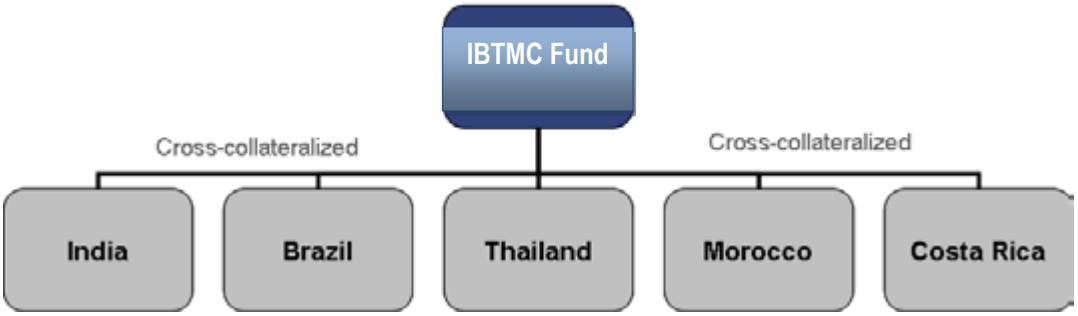
Based on the successful fund concept of the EFSE Fund (European Fund for Southeast Europe), Luxembourg is recommended as the legal domicile for a variety of reasons. The initiator of the Fund, the initial shareholders, and the eligible fund management company are familiar with Luxembourg law, the processes and the related counterparties eligible for additional services such as Custody and Transaction Management. This would speed up the fund set up and structuring process and would be in accordance with the ambitious time schedule for the set up of the IBTMC Fund (Fund for India, Brazil, Thailand, Morocco, and Costa Rica). The IBTMC Fund should be organized as a SICAV (Société d'Investissement à Capital Variable), a closed-ended investment company organized under the laws of the Grand Duchy of Luxembourg in the form of a public limited company (société anonyme, S.A.) for an unlimited duration. The Fund should be created as a specialized investment fund ("SIF") under the Luxembourg SIF Law.

3.2.2 Fund structure

The IBTMC Fund should be structured as an umbrella fund like the EFSE with some adjustments. It is proposed to set up National Subfunds for each country, but not to add regional Subfunds in order to reduce the complexity of the IBTMC Fund. If no regional Subfunds exist, it will also be unnecessary to pool the assets and to set up corresponding regional and national pools. During the initial phase of the IBTMC Fund, the following National Subfunds should be established:

- The IBTMC SA, SICAV-SIF – India
- The IBTMC SA, SICAV-SIF – Brazil
- The IBTMC SA, SICAV-SIF – Thailand
- The IBTMC SA, SICAV-SIF – Morocco
- The IBTMC SA, SICAV-SIF – Costa Rica

Figure 2: IBTMC Fund structure



Own source

All National Subfunds should be cross-collateralized meaning that any loss in one of the National Subfunds will affect all Subfunds and the effects on the C Shares will only be calculated on an aggregate IBTMC Fund level. All of the above mentioned modifications will reduce complexity, add to the transparency of the fund and make it more attractive for private commercial investors.

3.2.3 Risk subordination

The IBTMC Fund should build on the risk subordination mechanisms of the EFSE Fund. It should offer collective Shares and Notes that will be allocated on a pro-rata basis to the respective National Subfunds. While there should only be one class of Notes, the IBTMC Fund will issue various classes of Shares according to the successful EFSE model, which offer different levels of risk according to the structure shown in Annex C.

3.3 Corporate structure of the IBTMC Fund

The EFSE should be used as a blueprint for the corporate structure of the IBTMC Fund and to incorporate a Board of Directors, an Investment Committee, and an Asset-Liability Committee.

3.3.1 The board of directors

The Board will represent the IBTMC Fund and have the authorization to make any decisions on behalf of it in accordance with the Luxembourg law, the articles of Association and Incorporation, the Issue Document, and the Annual General Meeting of the Shareholders. It shall mainly consist of the Shareholders of the Fund. The Directors would be elected by the Shareholders at a general meeting of Shareholders. This general meeting of Shareholders would further determine the number of Directors and other terms and conditions.

3.3.2 The investment committee

The Board would appoint the investment committee consisting of between three to five members who do not need to be Board members. Its main responsibility would be to monitor and control the Fund Manager focusing on the investment pipeline, portfolio transactions, and the financial structure and performance of the Assets under Management. The IC will furthermore make decisions on investments in Partner Financial Institutions based on the detailed Investment Proposals to be submitted by the Investment Manager.

3.3.3 The fund manager

The Board on behalf of the IBTMC Fund will enter into a Fund Management Agreement with the Fund Manager to provide the following services to the Fund.

- Develop and implement a comprehensive Portfolio Management Strategy to mitigate country, market, and credit risks
- Identify, evaluate, negotiate and structure new PFI investment opportunities and present the respective Investment Proposals to the Investment Committee
- Review, monitor and supervise all outstanding PFI Investments and inform the Investment Committee or the Board of any early warning signs
- Manage the Technical Assistance Facility of the Fund

3.3.4 Custodian and transfer agent

The Board of Directors will appoint a Custodian and Transfer Agent for the IBTMC Fund and will conclude a Custodian and Transfer Agent Agreement with the Custodian. It is suggested not to separate the Custodian and Transfer Agency responsibilities since they are closely related. The Custodian and Transfer Agent's fees and costs will be charged to the IBTMC Fund in conformity with the Custodian and Paying Agent Agreement to be signed by the Board.

4 Conclusion

From the above pages, it is obvious that PFIs on low carbon development should be tailored to the particular country under consideration. Both local partners (the government and the private sector) should be engaged in strategic planning so as to give great responsibility for financing strategy to local stakeholders.

Every country should have the policies that affect carbon development modified in their frameworks and the power purchase agreements should be reviewed to attract the investment of the private sector. In the same line, policies dealing with trade should be structured or better yet have a section that covers currency risk associated with carbon trade since this is not an asset with stable and predictable returns.

Information about carbon development should flow easily within the specific country. Easy flow of information generally raises awareness and creates interest in the relevant stakeholders and other interested parties.

National financing programmes dedicated to low carbon development comprehensively should include financial risk management products, political risk insurance and other credit enhancements. In order for the programmes to secure local government support and engagement, they should emphasise TA and capacity building and where possible align local policy priorities – such as increasing employment or energy access. The programmes should seek to grow a network of partners and stakeholders and to channel funds where possible through local FIs, in order to increase learning, knowledge transfer and absorptive capacity among local actors.

Selection and design of the most appropriate PFIs requires the evaluation of: the level of technological maturity, the characteristics of the target market segment and the country conditions, including the macroeconomy, institutional structures and the maturity of the financial system.

Finally. this report provides specific recommendations for the establishment of National Low-carbon Centres under an Umbrella Fund structure for Brazil, Morocco, Thailand and Costa Rica. India is also included in the proposed Umbrella Fund structure, but PFI engagement there would ideally be coordinated or merged with the planned World Bank/DFID Low-carbon Innovation Centre for India in order to avoid duplication of efforts. This may mean refraining from the establishment of a new Centre in India, but a sub-fund within the Umbrella Fund structure could nevertheless be introduced in the context of a collaboration with the World Bank/DFID Centre.

International Organisations could play a role in tailoring the programme design for each of these Centres and sub-funds to their respective local contexts, which means establishing a comprehensive low-carbon development "diagnostic" framework for each country. It would be appropriate for the International Organisations to then remain involved in an ongoing process of monitoring and adjusting these frameworks as country conditions change and as programme impacts are assessed, which would entail rigorous comparison goals and outcomes to inform the modification of financing approaches over time. The local TA and capacity building components of each country programme, moreover, would provide further opportunity for engagement. To conclude, the International Organisations could perform a similar role in relation to existing PFIs by developing country-specific, low-carbon diagnostic frameworks within which the instruments should ideally be placed, and which should inform the adjustment of these instruments over time.

Annexes

Annex A: Overview of PFIs in the Target Countries

Annex B: Prospective Local Partner Organisations

Annex C: Umbrella Fund - Risk Subordination

Annex D: Umbrella Fund - Financial Model

Annex E: Interview Results: Existing barriers to investment

Annex F: List of Local Investors Interviewed

	Tools to make low-carbon investments economically viable (Increase Returns)	Tools to enable economically viable investments to be financed (Risk Reduction)			
		Project Finance Equity Finance	Debt Finance	Household and Business Investment	RE&EE SME Business Finance
Brazil	Investment and Operation phase: Feed-in-tariff (technology-specific for biomass, wind, solar, hydro) Tax incentives Renewable energy certificates Energy production payments Energy auctions	Risk coverage Equity guarantees Currency risk CER delivery insurance Support to private finance instruments Weather derivatives Future contracts for fuel supply in biomass power projects Insurance to RE projects	Liquidity support Direct project loans from development bank Credit lines for CFIs for on lending to RE-projects Fund of funds for institutional investors Risk reduction Mezzanine debt co-finance with CFIs P-P mezzanine funds Loan guarantees	Bank engagement Market expanding interest rate subsidy to PFIs Per loan transaction grant Loan guarantees	Public risk capital Innovation Challenge Funds Soft and loan facilities
Costa Rica	Investment and Operation phase: Tax incentives Feed-in-tariff (technology specific) Renewable energy certificates Energy production payments Subsidy to hotels for cost of maintenance contract for installed solar water heating system	Risk coverage Equity guarantees Currency risk insurance CER delivery insurance Support to private finance instruments Weather derivatives Future contracts for fuel supply in biomass power projects Insurance to RE projects	Liquidity support Credit lines for CFIs for on lending to RE-projects Fund of funds for institutional investors Risk reduction Mezzanine debt co-finance with CFIs P-P mezzanine funds Loan guarantees	Bank engagement Per loan transaction grant Loan guarantees Poverty tools Green mortgage for low-income houses If consumers buying CFLs manage to save 20% on their electricity bill, get top-up premium equal to additional 20%.	Public risk capital Innovation Challenge Funds Soft and loan facilities
India	Investment phase Project development grants for financial planning as basis for loan/equity application Interest rate subsidy since in India re-financing (also from development banks) is often offered at commercial rates Capacity building for public administration and utility providers	Risk coverage Equity guarantees CER delivery insurance Support to private finance instruments Access to equity is limited especially for small tickets (less than USD 5 million RE projects) and for non-profit project developers (who cannot offer high rates of return)	Liquidity support Credit lines for on-lending to RE-projects (already exist, but re-financing often at commercial rates, interest rates unaffordable for sub-borrower) Risk reduction Loan guarantees	Bank engagement Trainings needed (funds exist, but bankers not aware of EE/RE concept, results in high interest rates)	Public risk capital Innovation Challenge Funds Seed capital funds (especially for small-scale RE investments) Risk reduction PBGs to debt finance PBGs to equity

India ff.	Operation phase: Feed-in-tariffs (sufficient tariffs only exist in some states, but differ a lot within the country) RE certificates (remaining ambiguity about post-Kyoto situation, investors insecure, ask for guarantee fund) Energy production payments (at the moment no stringent PPAs. Utilities lack physical capacity for grid connection and are heavily indebted)				
Morocco	Investment and operational phase: Tax incentives	Risk coverage: Currency risk	Risk reduction: volatility of interest rate risk PP mezzanine Fund	Bank engagement: Per loan transaction grant (solar home system)	Public risk capital: Innovation challenge fund Seed capital fund Incubator facility (mixed with grant)
Namibia	Investment phase: Project development grants Investment Grant Interest rate subsidy trough DFI Tax incentives	Risk coverage: Currency risk		Bank engagement: Per loan transaction grant (solar revolving fund extension)	Public risk capital: Innovation challenge fund (support DBN) Incubator facility (mixed with grant)
Thailand	Investment phase: Seed capital (e.g. for feasibility and legal studies) Operation phase: Renewable energy certificates		Liquidity support Direct project loans from development bank Credit lines for CFIs for onlending to RE-projects Risk reduction: Loan guarantees	Bank engagement Loan guarantees	Public risk capital Seed capital funds
Vietnam	Investment phase: Seed capital (e.g. for feasibility and legal studies) Operation phase: feed-in tariffs	Risk coverage: Currency risk insurance			Public risk capital Seed capital funds

Annex B: Prospective Local Partner Organisations

Prospective partner	Description/relevance
India	
Ministry of New and Renewable Energy (MNRE)	Responsible for RE policy.
Bureau of Energy Efficiency (BEE), Ministry of Power	Responsible for developing EE policies and strategies, and for implementing the "Energy Conservation Act of 2001".
Central Electricity Regulatory Commission (CERC)	Enforces power sector regulations at national level.
State Electricity Regulatory Commission (SERC)	Enforces power sector regulations at state level.
Indian Renewable Energy Development Agency (IREDA)	Main provider of credit to RE and EE projects.
National Clean Energy Fund (NCEF)	Announced early 2010; to be the main mechanism for channelling public finance for funding R&D and innovative projects in clean energy technologies.
Climate Innovation Centre	Financed by World Bank/DFID, will support innovative start-up companies in climate technology.
Central Energy Conservation Fund	Under BEE, provides grants to EE projects.
Energy Efficiency Services Ltd. (EESL)	Main implementation arm of the National Mission for Enhanced EE.
Reserve Bank of India (RBI)	Supports the national biogas programme.
National Bank for Agriculture and Rural Development (NABARD)	Supports the national biogas programme.
Power Finance Corporation	Public finance institution that actively funds RE projects.
Rural Electrification Corporation	Public finance institution that actively funds RE projects.
Infrastructure Development Finance Company Limited (IDFC)	India's leading infrastructure financing institutions with significant exposure to clean energy.
IDBI, ICICI, IFCI, SBI, PNB	Prominent domestic banks that fund RE projects.
Brazil	
National Council for Energy Policy (CNPE)	Part of the Ministry of Mines and Energy, advises the government on national energy policy issues.
National Agency of Petroleum, Natural Gas and Biofuels	Responsible agency for biofuel policy.
National Electrical Energy Agency (ANEEL)	Responsible for implementing RE policy goals in the power sector.
National Energy Policy Board (CNPE)	Provides market agents with indicative projections for their investment plans.
Brazil National Economic and Social Development Bank (BNDES)	Large provider of finance to the clean energy sector.

Thailand	
Ministry of Energy	Supervises state-owned companies and overall energy policy formulation and implementation. Responsible for voluntary EE programmes (Energy Policy and Planning Office) and for mandatory policies and promotion (Dept. of Alternative Energy Development and Efficiency). Manages the Energy Conservation Promotion (ENCON) Fund.
Electricity Generating Authority of Thailand (EGAT)	State-owned company; owns half of national power generation capacity and is the national transmission system owner-operator and single buyer.
Board of Investment (BOI)	Awards tax incentives to investors in RE-generation capacity selling to the grid.
Asian Development Bank (ADB)	Provides guarantees for RE finance in Thailand.
Energy Regulatory Commission (ERC)	Manages the Power Development Fund financing promotion of RE generation.
Morocco	
Ministry of Mines and Energy	Defines and implements national policy for energy and supervises the activities of the elecricity producer ONE and of ADEREE.
Ministry of the Interior	Responsible for the technical supervision of energy distribution companies.
Ministry of Finance	Will have authority for the "Fonds National de L'Efficacité Energétique et des Energies Renouvelables".
Office National de L'Ectricité (ONE)	National power producer.
Agency for the Development of RE&EE (ADEREE)	Energy research institution with defined, policy-relevant operational responsibilities.
Societé d'Investissements Energétiques (SIE)	Shareholding company created in 2010 to support realisation of the national policy for RE&EE, esp. through equity investments.
Moroccan Agency for Solar Energy (MASEN)	Responsible for mobilising an estimated 70 billion Dirham in finance for the realisation of the 2000 MW CSP capacity by 2020.
Fond Hassan II pour le Développement Economique et Social	Invests in infrastructure projects including in new RE-generation capacity.
Costa Rica	
Ministry of Environment, Energy and Telecommunications (MINAET)	Sets national RE policy.
Instituto Costarricense de Electricidad (ICE)	Vertically-integrated national power company and the main agent for implementation of RE policy; prepares the national power expansion plans for approval by MINAET.
Agencia Reguladora de los Servicios Publicos (ARESEP)	Issues distribution and generation concessions.
National Energy Commission (CONACE)	Develops and implements the national energy saving plans.
Central American Bank for Economic Integration (CABEI)	Participant in financing RE projects in Costa Rica, esp. through partial risk guarantees.

Namibia	
Ministry of Mines and Energy (MME)	Responsible for authorising the granting of all licenses in the energy sector. Administers rural electrification and the Solar Electrification Revolving Fund.
Electricity Control Board (ECB)	Responsible for regulating the electricity sector.
NamPower	National power producer implementing a single-buyer system to attract private investment in power generation.
RE & EE Institute (REEEI)	Institute under the Polytechnic of Namibia; serves as a national information resource base for RE&EE.
Konga Investments	Manages the Solar Revolving Fund (SRF)
Development Bank of Namibia	Finances RE projects and RE&EE companies; established an Innovation Fund for entrepreneurs and early-stage technologies.
Bank Windhoek	Lends for household purchase of solar water heaters.
Vietnam	
Ministry of Industry and Trade (MOIT)	Line ministry for energy policy; oversees the state-owned energy companies.
Electricity Regulatory Authority of Vietname (ERAV)	Responsible for regulation of the energy sector.
Vietnam Electricity (EVN)	Main electricity provider.
Vietnam Cleaner Production Centre (VNCPC)	Manages the "Green Credit Trust Fund" with a Green Credit Line financed by the Swiss State Secretariat for Economic Affairs (SECO).
BIDV, SACOMBANK, VCB, Techcombank	Commercial banks in Vietnam that have begun to explore RE&EE lending possibilities with support from donors.

Annex C: Umbrella Fund - Risk Subordination

The proposed Umbrella Fund would issue various classes of Shares according to the following structure:

First Loss C Shares with an unlimited duration

The C Shares are the key foundation of the IBTMC Fund structure. They ensure the viability of the Fund and would account for roughly 40% of the total Fund capital according to the financial model of the IBTMC Fund compared to approximately 30% for the EFSE. The substantial increase in the amount of C Shares takes into account the higher risk profile of the respective countries and Projects as well as the fact that default rates might be higher for long-term loans compared to microlending. Therefore the C Shares would provide a comfortable risk cushion for investors in the B and A Share Class and the Notes. According to the risk subordination waterfall structure, the C Shares would directly be affected by fluctuations in the valuation of equity participations, writedowns on any financial instruments due to impairments and net Mark-to-Market gains and losses due to fluctuations in Foreign Exchange rates. The shares would be entitled to receive a target dividend of 1% and a complementary dividend depending on the income waterfall structure.

B Shares with tenors between 6 and 10 years (Mezzanine Tranche)

The B Shares will probably account for only 15% of the target Fund structure of the IBTMC Fund mainly due to the fact that the C Shares already provide a large risk cushion for the fund. Furthermore, B Shares would pay the highest target dividend given the fact that investors in B Shares would have a higher probability of losses compared to A Shares and Notes. Currently, a target dividend of 3.45% allowing a premium of 1% over Bonds with a ten year tenor issued by the Federal Republic of Germany is recommended. It is advisable to use this benchmark given the fact that the majority of C Shares will be subscribed by the German Federal Ministry for Economic Cooperation and Development. This dividend makes it less attractive for the IBTMC Fund to issue B Shares. The B shares will only suffer a net loss to the extent that the C Shares will be fully depleted through any losses.

A Shares with tenors between 3 and 7 years

It is expected that A Shares will account for 40-45% of the target Fund structure depending on the interest of private commercial investors to invest in Notes. Once the notes have been issued presumably in year 3, the portion of A Shares will probably decline from 45% to 40%. A target dividend of 2.67% for the A Shares equalling a premium of 1% over Bonds with a five year tenor issued by the Federal Republic of Germany is proposed. The A Shares will only suffer a net loss to the extent that the B Shares and the C Shares will have been depleted due to the types of losses stated above.

Notes with tenors between 2 and 5 years

It is suggested marketing those Notes to private institutional investors as an attractive alternative to supranational bonds offering a substantial yield pickup while having the same low risk profile. Attracting commercial investors would increase the outreach of the IBTMC Fund and make it a successful Public Private Partnership Vehicle with Double Bottom Line economic and social returns to all of its investors. Thus the IBTMC Fund will be an attractive investment vehicle for the growing number of private institutional investors who are looking for investments into low carbon funds in emerging markets being managed in a fair transparent and sustainable way. Equally it is suggested to also benchmark the yield against the Bonds with a five year tenor issued by the Federal Republic of Germany and to add a premium of 1%. So the Notes would be offered the same yield as the A Shares while having a lower risk profile thus making them more attractive to private institutional investors.

The Notes will only suffer a net loss to the extent that the A, B, and C Shares will have been depleted due to the types of losses stated above.

Payment Waterfall Structure of the Fund

The Custodian and Paying Agent (see section below) would determine the quarterly revenues and expenses of the IBTMC Fund and calculate the quarterly Net Asset Value of the Fund. The Income Waterfall Structure would be as follows.

1. Attribution of unrealized gains and losses to the C Shares (see section C shares above)
2. Payment of target dividends to the A Shares
3. Payment of target dividends to the B Shares
4. Attribution target capitalized dividend to the C Shares (see section C shares above)
5. Payment of the Performance Fee to the Fund Manager
6. Funding of the TA Facility
7. Payment of complementary dividends to the A, B, and C Shareholders (C Shares receive only capitalized dividends)

	Year 1	Year 2	Year 3	Year 4	Year 5
Exchange Rate USD/EUR	1.4	1.35	1.3	1.25	1.2
Assumptions of Financial Model Base Case					
Class	Year 1	Year 2	Year 3	Year 4	Year 5
Notes	0.00%	0.00%	10.00%	10.00%	15.00%
A-Shares	45.00%	45.00%	40.00%	40.00%	35.00%
B-Shares	15.00%	15.00%	15.00%	15.00%	15.00%
C-Shares	40.00%	40.00%	35.00%	35.00%	35.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
Funding in EUR					
TOTAL FUNDING	Year 1	Year 2	Year 3	Year 4	Year 5
Notes	0	0	7,000,000	8,500,000	15,000,000
A-Shares	22,500,000	27,000,000	28,000,000	34,000,000	35,000,000
B-Shares	7,500,000	9,000,000	10,500,000	12,750,000	15,000,000
C-Shares	20,000,000	24,000,000	24,500,000	29,750,000	35,000,000
Total Funding	50,000,000	60,000,000	70,000,000	85,000,000	100,000,000
Projected growth		20%	17%	21%	18%
Portfolio Composition and Assumptions					
	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Countries	3	5	7	7	7
Number of Banks	9	9	9	10	12
Average Investment	5,000,000.00	5,000,000	5,000,000	5,000,000	5,000,000
MFI Investment Portfolio	45,000,000	45,000,000	45,000,000	50,000,000	60,000,000
Number of ESCOs	0	1	2	3	3
Average Investment	7,000,000.00	7,000,000	7,000,000	7,000,000	7,000,000
ESCO Investment Portfolio	0	7,000,000	14,000,000	21,000,000	21,000,000
Number of ESCOs	0	0	1	1	2
Average Investment	6,000,000.00	6,000,000	6,000,000	6,000,000	6,000,000
Hydro Investment Portfolio	0	0	6,000,000	6,000,000	12,000,000
Total Portfolio	45,000,000	52,000,000	65,000,000	77,000,000	93,000,000
Cash (min. 5% of Assets)	5,000,000	8,000,000	5,000,000	8,000,000	7,000,000
Total	50,000,000	60,000,000	70,000,000	85,000,000	100,000,000

	Year 1	Year 2	Year 3	Year 4	Year 5
By Borrower in %					
Banks	90.00%	75.00%	64.29%	58.82%	60.00%
ESCOs	0.00%	11.67%	20.00%	24.71%	21.00%
Hydro, other RE, service & supply	0.00%	0.00%	8.57%	7.06%	12.00%
Cash 5% of Total Assets	10.00%	13.33%	7.14%	9.41%	7.00%
Total	100%	100%	100%	100%	100%
By Borrower in EUR					
Banks	45,000,000	45,000,000	45,000,000	50,000,000	60,000,000
ESCOs	0	7,000,000	14,000,000	21,000,000	21,000,000
Hydro, other RE, service & supply	0	0	6,000,000	6,000,000	12,000,000
Cash 5% of Total Assets	5,000,000	8,000,000	5,000,000	8,000,000	7,000,000
Total	50,000,000	60,000,000	69,999,999	84,999,999	100,000,000
By Instrument in %					
Senior Loans	95.00%	80.00%	60.00%	55.00%	55.00%
Subordinated Loans	0.00%	15.00%	25.00%	25.00%	25.00%
Mezzanine	0.00%	0.00%	10.00%	15.00%	15.00%
Cash	5.00%	5.00%	5.00%	5.00%	5.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
By Instrument in EUR					
Senior Loans	47,500,000	48,000,000	42,000,000	46,750,000	55,000,000
Subordinated Loans	0	9,000,000	17,500,000	21,250,000	25,000,000
Mezzanine	0	0	7,000,000	12,750,000	15,000,000
Cash 5% of Total Assets	5,000,000	3,000,000	3,500,000	4,250,000	5,000,000
Total	52,500,000	60,000,000	70,000,000	85,000,000	100,000,000

By Loan Tenor in %					
up to 5 years	80.00%	65.00%	55.00%	50.00%	50.00%
5-10 years	15.00%	20.00%	25.00%	25.00%	25.00%
up to 15 years	5.00%	10.00%	15.00%	20.00%	20.00%
Cash 5% of Total Assets	5.00%	5.00%	5.00%	5.00%	5.00%
Total	105.00%	100.00%	100.00%	100.00%	100.00%

By Loan Tenor in EUR					
up to 5 years	40,000,000	39,000,000	38,500,000	42,500,000	50,000,000
5-10 years	7,500,000	12,000,000	17,500,000	21,250,000	25,000,000
up to 15 years	2,500,000	6,000,000	10,500,000	17,000,000	20,000,000
Cash 5% of Total Assets	2,500,000	3,000,000	3,500,000	4,250,000	5,000,000
all	52,500,000	60,000,000	70,000,000	85,000,000	100,000,000

Annex E: Interview Results: Existing barriers to investment

This section provides a summary of the existing constraints on investment that were identified by local lenders in each of the target countries. The experts interviewed are listed in Annex F.

India

- The majority of project developers and independent experts see a general lack in funding, which implies an urgent need for customised non-standard financing vehicles.
- Lack of equity: Although several dedicated RE equity funds are available, especially for wind and hydro (and recently for small-scale energy efficiency), access to equity is nevertheless limited. This is especially true for small projects (less than USD 5 million RE projects) and for non-profit project developers (who cannot offer high rates of return).
- Loan tenor: banks only offer mid-term loans since they themselves do not have long-term re-financing.
- Interest rates are high because local banks do not have experience in EE/RE and – if available at all – IFIs apply commercial re-financing rates. Local banks need cheaper/longer re-financing and capacity building.
- Fund managers maintain that regulatory and other non-financial issues discourage investors. Regulations are not well advanced; in general the RE investment framework should be more stable and stringent; there are many uncertainties and differences across states. (However, some provinces do have reliable regulatory frameworks and purchase agreements as well as adequate feed-in tariffs.)
- Investment is hindered by general lack of capacity in public administration, which is characterised by insufficient streamlining of processes (permissions, subsidies), and generally cumbersome bureaucracy. Applying for permits and licenses takes too long, sometimes up to 3-4 years for small-scale RE projects. The payment of government subsidies (as a basis for venture capital or a bank loan) is often delayed, and projects are not realised as a result. More transparency and harmonisation is needed within the entire country, but this is almost impossible in the Indian federal system. Besides high capital costs, the process for land acquisition takes very long, and lease agreement are only valid medium-term.
- There is an urgent need for strengthening of utilities. Utilities at the moment freeze the RE sector. They lack physical capacities for grid connection and in addition are heavily indebted. They can neither purchase nor feed in the power produced by RE projects. There have to be increasing feed-in tariffs and more stringent power purchase agreements.
- There is uncertainty about the post-Kyoto situation (after 2012). Future benefits from CDM projects are unclear. Investors, however, need clarity.
- Bankers do not understand the technologies and offer loans at unaffordable rates.
- Industrial managers lack sufficient education about the concept of EE, and EE/RE project developers have to be supported in financial planning as the basis for loan/equity application.
- Developers do not always have sufficient technical expertise or basic data to apply for funding of RE projects.

Brazil

- Debt financing is constrained by the inability of lenders to secure personal guarantees of the loans from project developers.
- Loan tenor: projects require longer loan tenor than lenders are currently willing to provide. It is rare that Brazilian CFI give loans for more than 5 years due to inflation and the instability of the country. Although Brazil is stable now, there is still scepticism. This creates a financing gap for long-term investors.
- Lack of equity hinders investment in private-sector low-carbon projects even at a small scale (i.e. less than 1MW, often down to as low as 500 KW).
- Investment in Brazil is excessively concentrated, with only two major public investors. These are the Bank of Northeast Brazil (BNB) that is active in financing wind projects in the northern region of the country, and the Brazilian Development Bank (BNDES), which finances sustainable energy projects throughout the country.
- Lack of capacity among project developers and local investors constrains investment generally, and lack of understanding of carbon finance constrains investment in CDM projects. Carbon buyers currently offer advance payments only when the projects have strong sponsor support and in many cases resemble secured loans. This cuts off a large number of promising CDM projects, especially for smaller projects in developing countries. As a consequence, there is no alternative of sources of finance, which leads to market failure.

Thailand

- Lack of seed capital in the form of both debt and equity finance during the early stage of project development was identified as a primary constraint for the development of these projects. This implies difficulty conducting tests, feasibility and legal studies, and otherwise laying the groundwork for the project before it can become commercial.
- Difficulty in securing personal guarantees from project developers constrains debt financing.
- Lack of skills and knowledge: Experts pointed to a lack of skills in conducting technical due diligence and of "entrepreneurial skills" such as business planning and contracting. Project developers were also seen as lacking managerial and finance-related knowledge. Banks were seen to require capacity training for loan officers to conduct credit analysis for projects in the EE and RE fields. Insufficient technology transfer and the challenge of evaluating local technology were also identified as hindering investment.

Morocco

- The main barrier to investment identified by experts in Morocco is the inability to leverage local debt as a result of the fact that PPAs are based in local currency, creating a significant risk for potential investors.
- Volatility of the interest rate makes it difficult to acquire a fixed interest rate over a long-term period.
- Dearth of relevant projects needing to be financed was also identified as an obstacle to investment.
- Inability to sell low-tension supply (such as would be produced by a solar panel on a household roof) to the National Electricity Office (ONE) blocks investment in potential low-tension generation projects. The new RE law that has been enacted in 2010 in Morocco only concerns energy supply for high tension and middle tension transmission.
- The lack of an application tariff and the impossibility of agreeing on a tariff with an off taker using the ONE grid further constrain investment.
- Local enterprises lack project development capacity.

Costa Rica

- The commercial risk of PPAs in Costa Rica constrains investment in energy projects generally.
- Equity is lacking for even small investments by the private sector.
- Investment is constrained by the need for longer loan tenor than lenders are currently willing to provide.
- Investors experience difficulty in assessing the creditworthiness of project developers.
- Debt financing is constrained by the inability of lenders to secure personal guarantees of the loans from project developers.
- A lack of capacity among loan and credit authorities to effectively assess the risk of low-carbon projects results in hesitancy to accept these risks and thus a lower rate of loan or credit approval, posing a further barrier to potentially viable investment.
- Similarly, a lack of understanding of carbon finance constrains investment in CDM projects.
- Out-dated RE regulation implies suboptimal conditions for investment in Costa Rica.
- Where supportive laws do exist, the inability of the public sector to effectively implement the laws nevertheless poses a further constraint.
- Investment in new production is constrained by the lack of demand in Costa Rica for new renewable generation given because existing capacity already covers existing demand. New generation therefore lacks a guaranteed market in the local economy.
- Costa Rica is a stable country but is nevertheless too dependent on the global economy (especially USA). This enhances the risk to low-carbon investment from volatility of currency exchange and from global economic conditions that can constrain financial flows.

Vietnam

- Inflation risk due to high energy prices was identified by experts as a local barrier to investment in Vietnam.
- The monopoly of the state-owned energy company on power provision means it has effective veto power on the award of licenses in the country, which was identified as a further constraint on investment.
- The base price for the wholesale of power is kept low by the government, making low-carbon projects less commercially viable in the country.
- A lack of clear policies and tariffs for RE means project development is generally not active in this country.
- Supplementary background research furthermore indicates that large-scale development of grid-connected renewables has been hindered by (i) high transaction cost of negotiating a power purchase agreement (PPA) with Vietnam Electricity (EVN), the main electricity provider; (ii) an inhospitable and non-transparent regulatory framework with a lengthy approvals process; (iii) the absence of a procedure for allocating or re-allocating project sites to those most able to develop them; (iv) weakness of private sponsors to develop a site in a technically, socially and environmentally sustainable manner and take it to financial closure; (v) the same licensing burden as for large projects; (vi) the absence of suitably long financing tenors; and (vii) lack of skills among sponsors and bankers in assessing risk in such projects.

Namibia

- Experts identified an overall lack of available financing – whether debt from CFIs, equity from investors, or grants from donors. Many developers lack sufficient equity for scale-up given the large initial capital investments required by energy projects. At the same time, CFIs do not show interest in these projects, claiming that they are not bankable.
- Because the market is very young, grants are needed to develop pilot project for demonstration, to cover seed capital investment and for TA.
- Namibia has no feed-in tariff, and power deals are made on a single buyer model. This constrains transactions by subjecting the private sector to long negotiation and no price signal.
- The general electricity tariff in Namibia is not adequate to cover the costs of renewable energy generation.
- Namibia is unable to subsidise RE and is unwilling to impose a price increase that would be unacceptable to Namibian consumers.
- Investment is indirectly constrained by the lack of RE policy and of an integrated resource plan and mapping.

Annex F: List of Local Investors Interviewed

India

Company/Organisation	Contact person	Position
BEE	Mr. Saurabh Kumar	Secretary to Director General
Indian wind Energy Association	Mr. V Subramaniam	CEO & Secretary General
ABPS Infrastructure advisory	Mr. Balawant Joshi	Managing Director
ADB	Mr.Samuel Tumiwa	Senior energy specialist South Asia department
ICICI Bank	Mr. Jaisingh Dhumal	Head of Technology Finance
Infrastructure Development Fund IDFC	Ms. Manisha Gulati	Senior Vice President
Crestar Capital India	Mr. Hariharan Kumar	Officer
Ascent Capital	Mr. Subhasis Majumder	Director Private Equity
Myclimate	Mr.Martin Satadelmann	Officer
SKG Sangha	Mr. Vidya Sagar	President

Vietnam and Thailand

Company/Organisation	Contact person	Position
MFC Energy Fund	Mr. Graig Guzinzky	Regional Officer
Nollen Group Co. Ltd.	Mr. Austin Arensberg	Officer
USAID/ECO-ASIA Clean Development Climate Programme	Dr. Peter du Pont	Officer
Dragon Capital	Mr. Gavin Smith	Director Clean Development

Costa Rica and Brazil

Company/Organisation	Contact person	Position
BNDES	Mr. Luis André Sa d´Oliveira	Project Manager / SEF Dpt.
Fundo tecnologico FUNTEC	Mr. Jaime Gornsztjn	Project Manager
BID	Mr. Wesly Ureña	Consultant in RE
Grupo Otto Andrade	Mr. Otto Netto Andrade	CEO
E+Co	Mr. Wilhelm Baumgartner	Regional Manager LAC
Conduit Capital Partners LLC: Latin Power	Ms. Michelle Haigh	Vice President
Banco BCR	Mr. Carlos Ramirez Leiva	Servicios Banca Electrónica
Banco General	-	Servicio al cliente

Namibia

Company/Organisation	Contact person	Position
REEEI	Mr. Kudakwashe Ndhlukula	-
Nampower	-	Head office
AECF	Mr. Hugh Scott	-
Konga Investment Ltd.	Ms. Janiurek Ashipala	-
DRFN	Mr. Robert Schulz	-
ECB	Ms. Helene Vosloo	-
Soltec	Ms. Ursula Imbili	-
Innovent/innowind	Ms. Camille Verhaeghe	-

Morocco

Company/Organisation	Contact person	Position
SIE	Mr. Ait Hassou	Directeur développement énergétique
Capital Invest Morocco	Mr. Abdellatif Nasserdine	-
ADB	Mr. Hela Cheikhrouhou	-
GEREEF	Mr. Cyrille Arnould	Director
GROFIN	Mr. Chris D	-
afarge	Mr. Abdelali Demfanani	Chef de projet éolien tétouan

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