

ASIAN DEVELOPMENT BANK

The GCF and Private Sector Engagement

The Private Sector Facility
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Introduction

It is expected that a significant portion of the US\$ 100 billion to be channeled annually from sources in the developed countries to mitigation and adaptation projects in the developing countries will flow through the Green Climate Fund (GCF). The objective of the GCF is to assist the transformation of emerging and developing countries into low-carbon economies. The GCF has three tasks. (i) To channel financial transfers from “developed countries” to “developing countries”. (ii) To attract private investment from “developed countries” into mitigation and adaptation projects in “developing countries”. (iii) To engage private capital from developing countries in climate investments.

The TOR for this report ask for an analysis of and recommendations for how the GCF most effectively can stimulate private investment in climate projects in developing countries. This report attempts to fulfill three ambitions. First, to provide intelligent readers with limited exposure to climate finance with information, enabling them to understand the challenges in financing the transformation to low-carbon economies and the motivations of the private actors in climate finance. Second, to recommend a strategic focus for the GCF’s assistance to the private sector. Third, to recommend options for how the three facilities of the GCF - “Adaptation”, “Mitigation” and “Private Sector” (PSF) – can stimulate private investments in climate projects.

Chapter 1 reviews the financial flows to climate investments in 2010/2011 and the relative importance of private and public sources of finance in the developed and the developing countries respectively. The objective is to identify the scale of the finance challenge and the relative importance of the agents in climate finance.

Chapter 2 looks at the performance and the investment preferences of the key agents in climate finance and at some of the private finance innovations in climate finance.

Chapter 3 outlines the expected division of labor between ‘Adaptation’ and Mitigation’ on one hand, and the PSF on the other.

Chapter 4 analyses the importance for private investors of the NAPAs and NAMAs, that are going to be cofinanced by ‘GCF Adaptation & Mitigation’, donors and the multinational development banks.

Chapter 5 analyses options for the organization of the PSF’s private sector engagement.

Chapter 6 discusses the most important public finance instruments which the GCF is likely to employ in its support to the ‘greening of the finance’ sector.

Chapter 7 discusses the most important public finance instruments which the GCF is likely to employ in its support to the ‘green supply chain’: to project developers, service- and technology firms in the sector.

The Annexes provide supplementary information. Annex I has statistics on the international investments in renewable energy and in energy efficiency and in new low carbon technology companies. Annex 2 gives an overview of the recommendations that have been made up to now for the GCF’s private sector engagement. and for the Private Sector Facility (PSF) in particular. Annex III shows a matrix-presentation of subsidy instruments for renewable energy investments. Annex IV summarises a triangular private-private partnership to promote investments and achieve cost-reductions in offshore windfarm technologies.

Executive Summary

The scale of the green finance challenge

The global investment in mitigation and in adaptation is estimated at around US\$0.5 trillion in 2010/2011. The annual investment must triple to US\$1.5 trillion if the 2-degrees Celsius goal is to be achieved. The US\$1 trillion/year increase equals 1.7% of global GDP in 2010, which is large. Yet, the finance industry has achieved larger shifts than that: the share of global GDP, which was shifted into the construction bubble of the 2000s (the increment above the business-as-usual share of construction in global GDP), was larger.

It is not a shortage of investment capital that drives present “underinvestment” in low-carbon infrastructure and technologies. The fundamental obstacle to private investment, which climate policy has to address, is the lack of attractiveness of low carbon investments compared to alternative investment options. The scarce factor in climate finance is the \$180 billion to \$250 billion per year required to close the financial viability gap of the ‘additional costs’ of mitigation and adaptation projects. The finance for this comes from three sources: (i) the state budget in developing countries, (ii) energy and water consumers in developing countries and (iii) grants from developed countries (state budget transfers and purchases of credits from developing countries on the carbon market). All three depend on political will and political ability, meaning that the finance for covering viability gaps is uncertain. Even if sufficient additional cost finance is put forward, it will be stingy, meaning that the rates-of-return (RoR) on investments in climate projects provide commercial viability but little uplift potential (the possibility of achieving returns above normal industry returns from specific investments). The combination of uncertainty and the near absence of upside potential explain why “underinvestment” by private actors in low-carbon infrastructure is a concern for policy makers.

The actors in climate finance – key observations

For the Global Climate Fund’s (GCF) engagement with the private sector, two observations are particularly pertinent. First, finance from OECD countries contributed no more than 14 percent of the direct finance for climate investments in developing countries. The scaling up of climate finance depends, therefore above all, on the ability to mobilize funds from developing countries. Secondly, private actors contributed 90% of climate finance in the developed world, but only 52% in the developing countries. This means that increasing the engagement of private sector agents from developing countries in climate finance is a priority objective for the GCF. It involves: (i) getting commercial banks more involved in project finance (four out of five projects were financed on a balance sheet basis in developing countries); (ii) increasing the participation of ‘corporate actors’ and of ‘institutional investors’ in climate finance; (iii) sooner or later the continued decline in the cost of solar panels will trigger substantial ‘end-user investments’ by businesses, households, public buildings in rooftop systems.

The role of GCF’s ‘Mitigation’ and ‘Adaptation’ facilities in supporting private investment

The bulk of GCF finance – probably up to 80 percent - will be managed by GCF’s ‘Mitigation’ and ‘Adaptation’ facilities and be used to support Government climate programs - NAMAs (Nationally Appropriate Mitigation Actions) and NAPAs (National Adaptation Programs of Action) - as well as cross-border infrastructure investments proposed by collaborating governments.

‘GCF Adaptation & Mitigation’ has three strategic targets, which are (i) to assist Governments in putting in place de-risked national policy and regulatory frameworks, (ii) assist in the rationalization of international

donor support and (iii) assist Governments in putting in place support schemes that get maximum investment impact out of limited funds for additional cost finance.

In the pursue of these objectives, GCF Adaptation & Mitigation would employ the following instruments: (i) co-finance the ‘additional costs’ of investments in climate projects; (ii) finance TA for supporting the government in de-risking the policy and regulatory framework for investors; (iii) give grant support to the capacity building of relevant public and private actors and (iv) make conventional liquidity support in the form of refinancing facilities and on-lending loans available for collaborating domestic banks to finance investments included in the national program.

The de-risking of the national policy and regulatory environment through the NAPA/NAMA/GCF finance modality has the potential to substantially reduce investor uncertainties about the consistency and predictability of the regulatory framework and the size of the market for climate investments. As part of the risk mitigation effort, the GCF ought to finance the cost of private transaction advisors in key ministries.

The role of the Private Sector Facility (PSF)

The PSF provides the private sector with direct access to GCF support. Eligibility for PSF support to ad hoc private initiatives requires that they promote the achievement of objectives outlined in the official Government programs. PSF support facilities will operate at regional level, meaning that private project proposals from one country compete with private project proposals from other countries. This report suggests that the strategic mandate of the PSF is (i) to assist the ‘greening of the commercial finance sector in the developing countries’ and (ii) to strengthen the ‘green supply chain in developing countries’ (project developers, consultants and providers of technology, product marketing and servicing of low carbon technologies). The two mandates and the eligibility conditions ought to reduce the concern of some developing country governments that the PSF is going to be a free-for-all access table.

Where can the PSF position itself in the world of public finance instruments for low carbon investments?

Public finance instruments in climate finance have three major niches. One is to reduce perceptions in the finance sector of elevated risk in the early stages of expanding investments in low carbon projects; these are transitory instruments, which are accompanied by intensive TA for capacity building in the finance sector and in the green supply chain. The other is to address systemic risk for climate investment (e.g. loans to new-started SMEs). The third is to incentivise market and technology innovations.

In finding its niche, the first rule for the PSF is to avoid moving into public finance areas that are well-served by existing facilities. It is more efficient to provide additional finance to well-functioning initiatives than to create new structures. The second rule is to avoid introducing yesterday’s public finance instruments to meet the green finance challenges of tomorrow; since the engagement of commercial finance in climate investments develops fast, the public finance needs of tomorrow may be very different. A major block to commercial finance in climate investments is small market size and high risk; these problems disappear as national climate investments expand and risks are reduced.

Organisation of PSF’s interaction with the private sector

Many commentators expect investments in private equity and infrastructure funds to be the primary channel for PSF’s engagement with the private sector. However, these will undoubtedly be supplemented by growing direct investments in infrastructure by asset owners as have been seen in Northern Europe and North America. This report considers public investments in private equity and infrastructure funds to be an

example of a ‘yesterday’s public finance instrument’, which in future application is more likely to crowd-out than to crowd-in private investment. Public investment can, though, help bridge some of the challenges that are in attracting private sector investments to specific projects e.g. by ensuring a more feasible risk sharing. In Asia, private equity funds have expanded at a rapid pace during the last ten years; early 2013 around US\$100 billion of capital are laying idle in these funds due to a dearth of deals; sooner or later some of these will move into climate finance. This report also rejects the notion of ‘fund-of-funds’ as a viable instrument to attract capital from institutional investors due to the high investment costs associated with this investment vehicle.“ Instead, this report recommends the PSF to organise its collaboration with the private sector through two channels: An ‘Underwriting Facility’ to provide the GCF’s support to the greening of the finance sector. An ‘Innovation Fund” to support the development of quality green supply chains in developing countries.

‘Greening the finance sector’

The ‘Underwriting Facility’ is to have a broad mandate and flexibility in its choice of instruments. The primary task of the Facility is to assist two sector transformations. The first is to ‘green the banking sector’ in developing countries: making the terms and the conditions of bank loans more compatible with the capital intensive and long-term nature of climate investments. Major goals are to increase loan tenor and the share of non-recourse finance in bank lending. The second is to ‘green the capital market’ in developing countries: providing climate investments with access to capital market finance. The share of capital market finance must increase compared to bank lending to avoid that the scaling up of climate investments runs into finance bottlenecks.

This report recommends the Facility set up regional units and two corporations: one for construction finance to provide gap filling financial support in infrastructure construction; and one for geothermal exploration and development to implement exploration drilling and develop projects up to the level of a full feasibility study.

Expanding loan tenor

Back-ended partial credit guarantees are a well-tested public finance instrument to encourage banks to extend the tenor of their loans. Since a number of development and export-import banks are offering tenor-expanding guarantees already, it may more appropriate for the PSF to offer a take-out facility.

Increasing the share of non-recourse finance in bank lending to climate projects

The promotion of non-recourse lending will be high on the agenda of the PSF. Subsidy support to reduce the cost of partial credit guarantees and of partial risk guarantees – offered by commercial providers or by development banks to non-recourse loans of commercial banks – can be an interesting transitional instrument for getting non-recourse lending expanded on a market. It is being tested by ADB in India.

Mainstreaming energy efficiency lending into bank lending

Rather than using the International Finance Corporation’s (IFC) approach of introducing in banks project finance based concepts for energy efficiency (EE) lending to industries and other commercial entities, this report recommends the PSF to test the European Bank for Reconstruction and Development (EBRD) approach of mainstreaming EE lending in banks as part of general lending to their commercial clients. The PSF can in collaboration with larger national development banks and larger national commercial banks make available (i) grant-financed TA for preparing energy audits, (ii) TA to banks for the understanding of the

concept of energy audits and the appraisal of EE-loans, and (iii) a refinance facility for EE-loans that are given to industrial firms seeking a major loan for the expansion and/or modernization of an industrial plant.

Supporting green bond issues in developing countries

This report sees a midwife role for the PSF in the birth of green bond markets in developing countries. The point of PSF support to green bond issues is get green bonds to be seen and entrenched on the market as safe, high-quality assets. Marketing the environmental quality of green is a motivator for too few ‘socially responsible’ investors; by marketing the safe asset quality of green bonds, a broader investor base can be reached.

The institutional investors receive much attention in debates about the GCF. But considering the lack of success so far, it may be more productive for the PSF to assist the marketing of green bonds to a broad category of investors. Inter alia, this report recommends the introduction of green retail bonds, in view of the substantial household savings, which are placed presently in low-interest yielding Asian bank accounts.

The green bonds, as a new asset class, lack a history. During the introductory phase – say the initial five years until a first history has been established enabling rating bureaus to rate new bond issues objectively - it is likely that the bonds need to be wrapped if they are to find buyers. The cost of the guarantee is a first mover cost, which it would not be reasonable to impose on the first investors alone, also because this may increase the cost of bond capital to a level that makes the bond issue uninteresting for project developers. To get green bonds introduced and established on a national market, the PSF may subsidize the cost of credit guarantees for the first bond issues.

Being a new asset class, the first green bond issues on the market may fail to find sufficient off-take. The PSF’s ‘underwriting’ facility can anticipate this situation by serving as anchor investor for a significant share of market testing new bonds.

Supporting green share issues in developing countries

The same anchor investor approach can be used to support share issues in special purpose vehicles or corporations that use the proceeds to invest in purchases of operating low-carbon assets. Such vehicles are another tool to promote secondary financing of low-carbon investments. This offers project developers and banks an exit for their primary investments.

Assisting institutional investors in developing countries to set up jointly owned infrastructure funds

The high fees – and relatively low returns on low-carbon infrastructure investments – lead institutional investors to circumvent asset managers and either invest directly in low-carbon projects or set-up infrastructure funds jointly with other pension funds. The PSF can support such initiatives in developing countries in the initial exploratory stages.

Construction Finance Corporation

The objective of the facility is to serve as a back-stopping and gap-filling provider of finance to private projects, which are commercially viable and of high priority for Government policy. The facility would offer *sub-ordinated debt* to encourage banks to take construction risk, *construction equity* if that is needed for financial closure and capital on a contingent basis, *callable subordinated debt*, which is injected when construction costs overrun substantially.

Geothermal Exploration and Development Corporation

The Geothermal Development Corporation would invest in the early phases of resource exploration up to the point of a full feasibility study for a geothermal power plant based on proven geothermal potential. At that point, the Corporation would sell the rights for the development of the project to a power plant investor.

Supporting the development of green supply chains

This report recommends that PSF's assistance to enterprises in the green supply chain be provided through the Innovation Fund, a fund-of-fund managed by PSF staff, which finances a number of specialized sub-funds, most of which would be managed by PSF staff as well, others by private managers found by tender.

This report recommends that the Innovation Fund:

- at the **strategic-transformative level** be responsible for (i) assisting countries in establishing effective *public-private partnerships* for investments in mitigation and adaptation projects; (ii) facilitating the formation of productive *private-private partnerships* for investments in mitigation and adaptation projects, and (iii) advising Governments on initiatives likely to foster efficient *industry clusters*.
- in terms of **assistance to individual enterprises**, focuses its support on three areas: (i) critical finance gaps of small-scale project developers; (ii) co-financing support to the development phase of innovative mitigation and adaptation projects that are proposed by high-tech companies and which have very promising transformative potential; (iii) business innovations by start-up companies in developing countries.

Support to the creation of PPPs

The Innovation Fund would finance TA for the development of promising PPP concepts and for the structuring of PPP contracts.

Support to public-private-partnerships

The recommended tools for the PSF's support to transformative private-private partnerships would comprise (i) A 'Challenge Fund for Private-Private Collaboration' to cost-share in the initial development of innovative partnership projects with transformative impacts and replication potential in other countries.; (ii) in relevant cases, e.g. the case of a strategic partnership marketing climate resilient agricultural technology to farmers, a separate 'Mezzanine Finance' facility could provide follow-up support in the form of a mezzanine loan (contingent finance loan) to co-finance investments in early market development after the partnership is established.

Assisting small-scale project developers

The report recommends the Innovation Fund to assist small scale project developers in bringing planned projects to a successful conclusion. Instruments would comprise contingent project development grants, a construction finance company could assist in closing critical finance gaps during the construction phase.

Seed capital to assist business innovations by high-tech firms

In order to get high-tech established firms involved in developing innovative climate projects, the report recommends that the Innovation Fund offers seed-capital on a contingent grant basis to cost-share in the

development of project concepts up the pre-feasibility study stage, provided that these clearly fall outside the core activity of the firm.

Incubation facility for innovative start-up SMEs

This report recommends the Innovation Fund to set up a facility providing support to the preparation of feasibility studies for incubation centers and for the initial start-up of centers for which the demand was confirmed by their feasibility study.

Abbreviations and Accronyms

| | |
|--------|---|
| ADB | Asian Development Bank |
| AMC | Advance Market Commitment |
| BoP | Base of the Pyramid |
| CSO | Civil Service Organisation |
| GCF | Green Climate Fund |
| CPI | Climate Policy Institute |
| DFI | Development Finance Institution |
| DFID | Department for International Development |
| DSM | Demand Side Management |
| EBITDA | Earnings before interest, taxes, depreciation, and amortization |
| EE | Energy Efficiency |
| EIB | European Investment Bank |
| ESG | Environmental, Social and Governance |
| FI | Finance Institution |
| GDP | Gross Domestic Product |
| GHG | Green House Gas |
| ICF | International Climate Fund |
| IDB | International Development Bank |
| IDFI | International Development Finance Institution |
| IFC | International Finance Corporation |
| IFI | International Finance Institution |
| IPO | Initial Public Offering |
| IRR | Internal Rate of Return |
| ISGGF | India Solar Generation Guarantee Facility |
| JVC | Joint Venture Company |
| LCCRS | Low-Carbon, Climate-Resilient Strategy |
| LDC | Less Developed Country |
| LEDs | Low Emission Development Strategies |
| NAMA | Nationally Appropriate Mitigation Actions |
| NAPA | National Adaptation Program of Action |
| NDB | National Development Bank |
| NPV | Net Present Value |
| MRV | Measurement, Reporting and Verification |
| NFI | National Finance Institution |
| O&M | Operation and Maintenance |
| PBG | Publicly-backed Guarantee |
| PCG | Partial Credit Guarantee |
| PIDG | Private Infrastructure Development Group |
| PPA | Purchasing Power Agreement |
| PFI | Private Finance Institution |
| PSF | Private Sector Facility of the Green Climate Fund |
| RE | Renewable Energy |
| RFDF | Retail Finance Development Fund |
| ROCE | Return on Capital Employed |
| RoE | Rate-of-Return on Equity |
| RoI | Return on Investment |
| SCO | Civil Society Organisation |
| SIDS | Small Island Developing Country |
| SME | Small and Medium Enterprise |

| | |
|-----|---|
| SPV | Special Purpose Vehicle |
| SRI | Socially Responsible Investing/Investment |

Glossary

| | |
|----------------------------|--|
| Angel investor | (or business angel) An affluent individual who provides capital for a business start-up (see also seed capital) |
| Climate finance: | Resources that catalyse low-carbon and climate-resilient development |
| Contingent grants | Loans without interest and repayment requirements until the technology and intellectual property have been successfully exploited (see also project development grant) |
| Equity: | The part of a company's capital which is share capital |
| Feed-in-tariff: | Fixed kWh-tariff paid to RE-power plants up to a maximum size, e.g. 10 MW. Feed-in-tariffs are technology specific, reflecting differences in costs of production; e.g. wind farms will be paid a lower tariff than solar PV-plants. |
| Loss Reserve Fund: | Funds placed in an account to provide risk coverage for a financial institution's losses on a portfolio of loans to eligible investments and borrowers. The size of the loss reserve is determined with reference to the estimated default risk (loss rate). A key advantage of loss reserve funds is that no guarantor is required. |
| Mezzanine finance: | Finance positioned in the financing package somewhere between equity and fixed returns debt (loans): Mezzanine loans take more risk than senior debt because regular repayments of the mezzanine loan are made after those for senior debt, however, the risk is less than equity ownership in the company. Unlike a bank loan, mezzanine finance does not hold real assets of a company as collateral; instead, lenders offering mezzanine financing have the right to convert their stake to an equity or ownership in the event of a default on the loan. |
| Patient capital | Funds invested for medium or long term (5 to 10 years) in a business with no expectation of turning a quick profit. In the commercial private sector, the term is associated with equity-type investment for long-term value maximisation; in the 'social economy' with mezzanine-type finance targeting a combination of social and economic returns. |
| Project Development Grant: | Grant "loaned" without interest or repayment until the project has become financially viable. |
| Public finance instrument | Use of public monies to mobilise private investments in RE&EE by addressing financing gaps along the finance continuum where the private sector is unable or unwilling to provide capital on a purely commercial basis. |
| Seed-capital: | Equity or mezzanine-type capital from private investors other than the owner-entrepreneur in start-up firms with no access to bank loans |
| Sub-ordinated loan: | A subordinated loan has a lower priority of repayment in case of default than the senior loan. It has only recourse to assets after the claims of the senior lender have been met. (see also mezzanine finance) |

Country categories: (World Bank categorization):

- Low income countries or LDCs: gross national income (GNI) per capita of US\$ 1,025 or less
- Lower middle income countries: GNI per capita US\$ 1,026 -4,035
- Upper middle income countries or emerging economies: GNI per capita between US\$ 4,036 – 12,475

1 Finance flows for climate investments in 2011 and the case for the GCF

1.1 Global climate investment 2010/11

1.1.1 Structure of investments by sector

A number of studies have estimated the existing and the required volume of climate finance. Based on information from different sources, Table 1 estimates the annual investment volume for 2011 at half a trillion US-dollars.¹

Table 1: Global Investment in Mitigation and Adaptation 2011

| | Billion US\$ | In % |
|--|--------------|-------------|
| Investment in mitigation | | |
| - Renewable power and fuels ¹⁾ | 257 | 52% |
| - Solar water heating ²⁾ | 10 | 2% |
| - Energy efficiency ³⁾ | 180 | 37% |
| - Sustainable forestry and land management ⁴⁾ | 39 | 8% |
| Investment in adaptation⁴⁾ | 16 | 3% |
| TOTAL | ~492 | 100% |

Sources: (1) Bloomberg (2012), (2) Mauthner & Weiss (2012) (3) IEA-(2012), (4) CPI (2012)

It is likely that the investment figure for adaptation represents an underestimate – the investments are difficult to define and to identify. Yet, even a tripling of the investment figure would still yield a share of less than 10 percent of the total. Investments in energy efficiency (EE) are by the IEA expected to provide roughly 60 percent of the CO₂-reduction up to 2030. That only 37 percent of mitigation investments went to EE does not necessarily indicate relative under-investment; it also reflects the fact that EE investments are cheaper per ton saved CO₂ than investments in renewable energy (RE).

Annex I provides more detailed information on the finance flows into EE, RE and adaptation.

1.1.2 Structure of investments by type of investor in 2010

The private agents in climate finance comprise project developers, corporate actors, commercial banks, institutional investors, household investors, angel and venture capital investors, and private equity and infrastructure funds. The CPI report ‘The Landscape of Global Climate Finance 2012’ analysed the respective share of these in climate finance. The information is summarized in table 2.²

To understand table 2, some information about the methodology employed in the CPI report is required. The objective of the CPI report is to clarify how the *investment is financed upfront*. The refinancing of an initial investment is not included; e.g. a bond issue after commissioning of a windfarm, which serves the purpose of replacing the bank loans that financed the construction. ‘Additional cost’ finance in the form of feed-in-tariffs and tax benefits are not included in the table because they are not part of the financing package for an investment; whereas upfront investment grants are! Bank loans for construction are counted as bank finance

¹ For reference purposes: This is equal to the annual spending by the so-called ‘oil majors’. “Annual capital spending for the industry has more than tripled in the past 10 years, reaching \$550bn in 2011” according to the article “Energy: More buck, less bang”, Financial Times April 11, 2013.

² The US\$376 billion estimate for the volume of global climate investments in 2011 is too low, illustrating how difficult it is for organisations to collect reliable data on climate investments and to agree on definitions for ‘energy saving investment’ and ‘adaptation investment’.

if provided as project finance³. When provided as balance sheet finance⁴ they are counted as a financial contribution by the recipient developer/corporate investor. Bank loans to investments in rooftop PV systems are counted as finance from households. The approach explains why the contribution of commercial bank finance in the table is so small.

Table 2: Global climate finance flows, annual averages 2010-2011

| | Developing countries | | Developed countries | | Total | |
|--|----------------------|-------------|---------------------|-------------|--------------|-------------|
| | US\$ billion | % | US\$ billion | % | US\$ billion | % |
| Private Actors: | 98 | 52% | 170 | 90% | 268 | 71% |
| - Project developers (mainly utilities) | 65 | 35% | 58 | 31% | 123 | 33% |
| - Corporate actors & CE manufacturers | 13 | 7% | 62 | 33% | 75 | 19% |
| - Commercial banks ¹⁾ | 12 | 6% | 24 | 13% | 36 | 10% |
| - VC/private equity/infrastructure funds | 0,3 | 0% | 1,7 | 1% | 2 | 0,5 |
| - Institutional investors | | 0% | | 0% | 0 | 0,25 |
| - Households | 8 | 4% | 24 | 13% | 32 | 9% |
| Public actors | 89 | 48% | 18 | 10% | 107 | 28% |
| - Development finance institutions | 70 | 37% | 7 | 4% | 77 | 21% |
| - Public budgets (domestic) | 8 | 4% | 11 | 6% | 19 | 5% |
| - Grants from developed countries | 11 | 6% | | 0% | 11 | |
| TOTAL | 187 | 100% | 189 | 100% | 376 | 100% |

1) Bank loans to 'project finance' only; bank loans to 'balance sheet finance' is included under project developers.

Abbreviations: CE = clean energy; VC = venture capital

Source: Table based on data from CPI (2012)

The overall investment volume was almost equally distributed between investments in developing countries and developed countries. However, the structure of finance was different: *private actors* contributed 90% of climate finance in the developed world, in the developing countries only 52%.

*Project developers*⁵ - energy utilities, energy companies, engineering firms, independent developers of projects - contributed 33% of global climate finance, financing 35% of climate investments in the developing and 31% in the developed countries.

Globally, 55% of projects were financed on a *balance sheet* basis, 45% through *project-finance*; in *developing countries*, four out of five projects were financed on a balance sheet basis. The leading providers of project-level (non-recourse) debt were commercial banks with 77%, public budgets contributed around 17%, corporate players 6%.

Domestic private actors contributed up to 83% of private investments in developing countries.

Corporate actors - non-energy companies investing in emissions reduction assets to reduce their energy bills and manufacturers of clean energy systems financing the deployment of their systems - contributed 19% of

³ Definition by International Project Finance Association, IPFA: "The financing of long-term infrastructure, industrial projects and public services based upon a non-recourse or limited recourse financial structure where project debt and equity used to finance the project are paid back from the cashflow generated by the project." Investopedia: "project financing is a loan structure that relies primarily on the project's cash flow for repayment, with the project's assets, rights, and interests held as secondary security or collateral." That is, it is off-balance sheet finance.

⁴ Loans given to a company against its overall assets and credit worthiness; the loan appears as a liability in its balance sheet.

⁵ Defined as dedicated entities with the ability to design, commission, and operate and maintain emissions reduction projects.

global climate finance; 33% of the finance in developed countries and 7% in the developing countries.⁶ The large difference indicates a strong growth potential in developing countries for climate investments by corporate actors.⁷

Less surprising is the difference in the financial contribution of *households*. They accounted for 13% of climate finance in the developed versus 8% in the developing countries leading to a global contribution of 9%. The higher level of average household income in the former leads to higher levels of investment in distributed clean energy supply and in energy savings.

Public actors provided 28% of global climate finance and all of the 15% (US\$ 54 billion) of total climate finance that was delivered in the form of low-cost debt. Public intermediaries delivered more than 60% of their financing through concessional loans and about 7% in the form of grants. 48% of climate finance in the developing countries comes from public actors versus 10% in the developed countries. The dominant public actor is the development finance institutions (DFIs), which provided 37% of the climate finance in the developing countries versus 4% in the developed countries. Reflecting the huge size of the China Development Bank and Brazil's BNDES, national DFIs provided around 87% of global DFI finance and 57% of the climate finance from public actors. 33 % of DFI finance goes to China, 18% to Brazil.

Broadly speaking, *DFIs in the developed countries* and the *international DFIs financing projects in the developing countries* engage in the high risk / early innovation / early dissemination phases of climate investments.⁸ This makes the international DFIs the most likely GCF-partner in innovative, know-how transfer projects. The *national DFIs in the developing countries* finance the scaling up phase of climate finance, making them prime co-financing partners of NAMAs and of other national climate programs.

The CPI report estimates the contribution of *institutional investors* to emissions reduction projects at a meager US\$ 620 million for the year 2011. The need to raise their involvement is one of the challenges in international climate finance. Only 11% of institutional investors' money went to developing countries; raising this proportion will be an important focus for the GCF's collaboration with the private sector.

Dedicated Climate Funds contributed at least US\$ 1.5 billion to overall flows. The GCF can get early involvement in project finance by investing in the most successful of these.

The share of *venture capital funds* in total climate finance may be small. But since it is focused on the early phases of technology development, their strategic importance is high.

1.2 Estimates of the required increase in green finance

International organizations come up with different estimates.

⁶ The share of finance from corporations may even be larger: the CPI report underestimates investments in energy efficiency which is an area where corporate are particularly active.

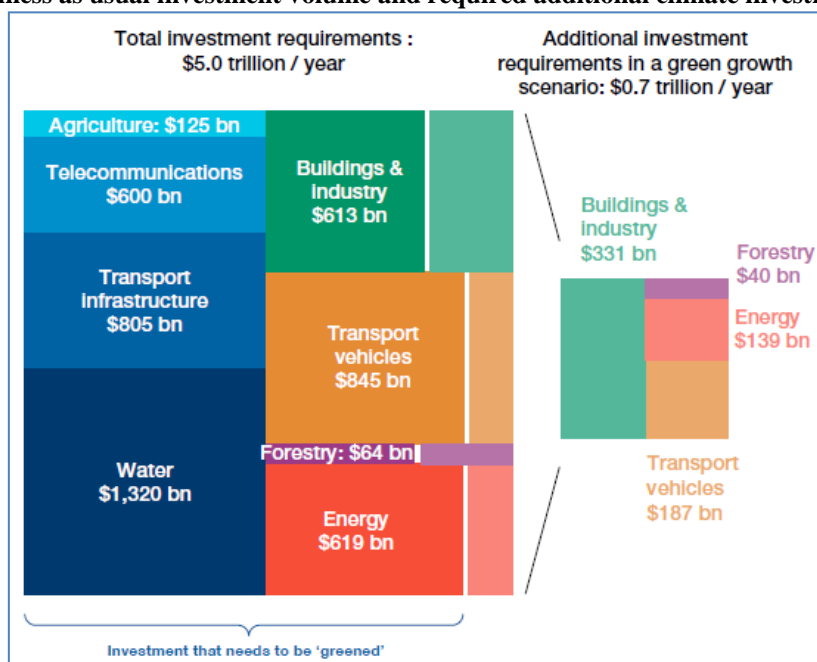
⁷ The CPI report provides no information on in which countries the corporate sector has been particularly active. One may speculate that the share is highest in the USA due to the prevalent use of tax incentives for investments in clean energy.

⁸ A report commissioned for the International Development Finance Club (IDFC) - "Mapping of Green Finance Delivered by IDFC Members in 2011" - examined the green financing activities of 19 bilateral and national development finance institutions (DFIs). Their green finance amounted to USD 89 billion in 2011. The non-OECD DFIs provided USD 44 billion to green investments in their home countries. The OECD DFIs financed USD 30 billion of green investments in OECD countries and USD 15 billion in non-OECD countries.

The IEA's World Energy Outlook 2012 provides a finance gap analysis for mitigation investments over the period 2011-2035. It analyses two scenarios: the 'new energy policy' and the "efficient energy policy" scenarios. The former estimates the investment volumes and emission reductions resulting from existing and planned energy policy measures. The latter adds the investment volume of additional policy measures required to achieve a maximum 2 degrees Celcius temperature increase. The report estimates that the additional gross investment of the 'efficient energy policy' is US\$ 16 trillion (2011 prices), or US\$650 billion per year. Including the upward shift from already planned policies, the total increase amounts to US\$ 1 trillion/year.

The World Economic Forum estimates that infrastructure investment required for sectors such as agriculture, transport, power and water under current growth projections stands at about US\$ 5 trillion per year to 2020 and that the additional investment needed to meet the climate challenge - for clean energy infrastructure, sustainable transport, energy efficiency and forestry - is about US\$ 0.7 trillion per year.⁹ The chart below summarizes the composition of the "business-as-usual" and of the "additional" investments by sector.

Figure 1: Business as usual investment volume and required additional climate investment up to 2020



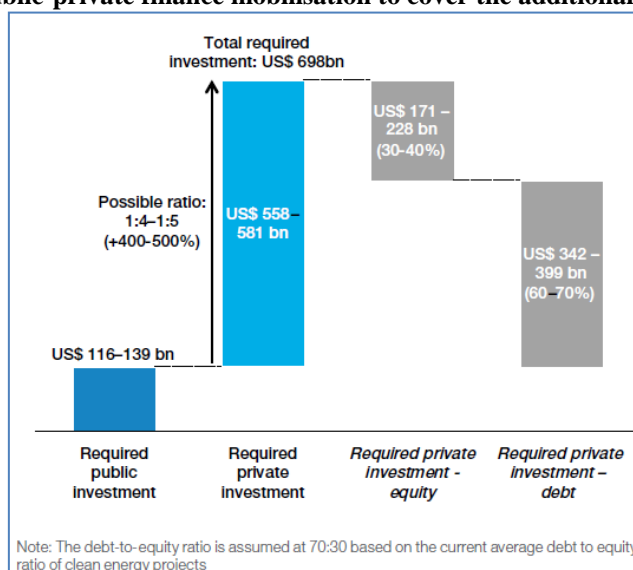
Source: WEF (2013)

'Buildings and industry' account for almost one half of the 'additional finance' requirement, 'transport vehicles' for about a fourth, 'energy' for about a fifth and 'forestry' for a twentieth.

The chart below shows, how the WEF report expects the US\$0.7 trillion to be financed by 'public finance', debt finance and equity finance, respectively. The assumption is that 'public finance' instruments can leverage private finance in the ratio of 4:1 or 5:1 and that private finance will be composed of 70/60% debt and 30/40% equity. This results in the estimate of US\$113-139 billion of 'public finance' and US\$558-581 billion of private finance, of which US\$171-221 billion is equity finance.

⁹ WEC: "The Green Investment Report. The ways and means to unlock private finance for green growth." 2013

Figure 2: Annual public-private finance mobilisation to cover the additional investment until 2020



Source: WEF (2013)

1.3 Share of finance from developed countries in financing investments in developing countries

The international debate on the GCF's role as mobiliser of public and private finance from OECD countries for climate investments in developing countries has focused on two issues. One is on GCF's mobilisation of grant finance from OECD countries to cover the 'additional cost' of climate investments in developing countries. The other is on the GCF's mobilisation of private finance from OECD countries for investments in developing countries.

The data summarized in table 3 indicates that the emphasis of the discussion is misplaced. Finance from OECD countries contributed no more than 14 percent of the direct finance for climate investments in developing countries. The strategic issue for the GCF should be reframed as 'how to use GCF finance most effectively to mobilize climate finance from the developing countries themselves.

Table 3: Contribution of finance from OECD countries to climate investments in developing countries, 2010

| | |
|--|-------------|
| Finance share of private actors | 52% |
| - from developing countries | 83% |
| - from emerging economies | 2% |
| - from OECD countries | 15% |
| Finance share of public actors | 48% |
| - developing economies | 88% |
| - OECD public money transfers | 13% |
| TOTAL | 100% |
| - finance from developing economies | 86% |
| - finance from OECD countries | 14% |

Source: Table based on data from CPI (2012)

Although the shares were relative small, their impact was high. The 6 percent finance contribution from the public sector in OECD countries was mainly grants for ‘additional cost finance’. The 8 percent contribution from the private sector in OECD countries was accompanied by a transfer of know-how.

1.4 Observations and conclusions of relevance for the GCF

1.4.1 Does the size of the shift towards green finance pose a problem?

The size as such of the required increase in green finance volume is not critical; the global finance system has shown in the past that it can manage shifts of the called for magnitude.

First, global capital is mobile and the required shift towards green finance is small in relative terms:

- The US\$1 trillion/year equal to *1.7% of global GDP in 2010*; the share of global GDP, which went into the construction bubble of the 2000s (the increment above the business-as-usual share of construction in global GDP) was larger than that.
- The total global financial assets amounted to US\$ 600 trillion in 2010 and are expected to increase to US\$ 900 trillion (measured in prevailing 2010 prices) by 2020.¹⁰ The 10 trillion in additional investment up to 2020 represent *3.3% of the expected US\$300 trillion increase in global financial assets*.
- Global total infrastructure spending averaged around US\$2 trillion per year during the past 18 years¹¹. The additional climate investment adds 50 percent to that. On a forward looking basis the percentage gets even lower: The US\$700 billion equal 14% of WEF’s US\$5 trillion ‘business-as-usual’ investment in infrastructure.
- The finance sector has already demonstrated its capacity to accommodate a fast growth in climate mitigation investments: the growth in the global demand for solar panels grew from 170 MW per year in 2000 to 23 GW per year in 2011.
- Also at specialized level, flows can change fast: US mutual funds, specialized in investing in bank loans, had US\$12 billion in assets at the end of 2008, at the end of 2012 more than \$76 billion.

Secondly, financial markets in China, India and other emerging economies, the countries where most of the additional climate investment has to take place, continue to expand and develop their own financial sectors. On China’s corporate bond market, for example, bond issuance increased about 60 per cent by volume in 2012 compared to 2011.

Fourthly, the glut of finance on the international markets is depressing the rates of interest and is starting to have a downward impact on the rate-of-return on equity (RoE) expectations of financial investors.¹² The reduction in the cost of capital makes it easier for the capital intensive climate investments to compete with conventional technologies. Large scale investments with long pay-back periods, which previously only governments had the ability to undertake, are now getting closer into the range of the private sector investors with long-term investment horizons.

¹⁰ Bain & Company: “A world awash in money. Capital trends to 2020”, 2012

¹¹ McKinsey Global Institute: “Resource revolution: Meeting the world’s energy, materials, food, and water needs”, November 2011

¹² Opinions differ on how the capital supply-demand balance will develop during the rest of the decade. McKenzie, in a report from mid- 2012, forecast a tight investments-savings balance by the end of the decade. Bain, in its end of 2012 report, concludes that “markets will generally continue to grapple with an environment of capital superabundance”. Inter alia, Bain expects China’s contribution to the growth of global capital to increase from US\$39 trillion in 2010 to some US\$125 trillion at the end of the decade.

Yet, in the end, a word of caution is needed. The value of global financial assets has grown by just 1.9 per cent annually since 2007 from 7.9 percent average annual growth from 1990 to 2007. The slowdown in the growth of financial assets extends to emerging economies, where the development of financial markets is barely keeping pace with gross domestic product growth.¹³ Redirecting flows of finance to green investments is easier in a world of fast growing financial assets than in a slow-growth situation.

Thus, the GCF may also have to perform *the ‘green bank’ role of supporting lender when other financial channels get clogged*.¹⁴ It is not all about achieving transformational impacts.

1.4.2 Is finding finance to cover the ‘viability gap’ the critical issue?

The scarce factor in climate finance is finance for covering the ‘additional costs’ of mitigation and adaptation in developing countries. The ‘additional cost’ coverage makes otherwise non-viable climate investments commercially viable. It determines the demand for investments from project originators. Without their demand, there are no private projects and hence no need for equity and debt finance.

Estimates of the size of the additional costs in the developing countries differ; the World Bank’s estimate is \$180 billion to \$250 billion per year.¹⁵

The finance for additional cost coverage comes from three sources: (i) the state budget in developing countries, (ii) energy and water consumers in developing countries and (iii) grants from developed countries (state budget transfers and purchases of credits from developing countries on the carbon market). All three depend on political will and political ability, meaning that the financing of additional cost cover is uncertain.

Even if sufficient additional cost finance is put forward, it will be stingy, meaning that the rates-of-return (RoR) on investments in climate projects will provide commercial viability but little uplift potential.

The combination of uncertainty and the near absence of upside potential - meaning the possibility of achieving returns above normal industry returns from specific investments - explains why “underinvestment” by private actors in low-carbon infrastructure and technologies is a concern for policy makers. The UK government’s reason for setting up the state-owned Green Investment Bank - in a country with arguably the most advanced finance sector in the world and a political commitment to long-term low carbon development, which is enshrined by law – is not a shortage of investment capital; it is the lack of attractiveness of low carbon investments compared to alternative investment options. This is the fundamental obstacle to investments which climate policy has to address. All other barriers are secondary to that.

1.4.3 Share of private actors in developing countries climate finance

Private actors finance a much lower share of climate investments in the developing countries than in the developed countries. In line with the growth in climate investments in developing countries, the contribution of the private sector must increase in order to avoid that the growth in climate investment is strangled by the limits to public sector investment capacity. The primary objective, therefore, of the Private Sector Facility

¹³ Source: Financial Times “Three steps to stop financial collapse”, March 20, 2013

¹⁴ PW March European banks will need to shed as much as another €3.4tn from their balance sheets over the coming years by reducing lending and selling assets. SMEs and the financial markets are adjusting to the shortfall in bank lending by turning to other sources. Asset managers are setting up companies financing funds to lend relatively small sums of money directly to European companies that are finding it difficult to borrow from traditional lenders. SME bonds markets are being developed, direct bonds as well as securitized bank loans to SMEs.

¹⁵ World Bank: “Beyond the sum of its parts, combining financial instruments to support low-carbon development” The International Bank for Reconstruction and Development”, 2010

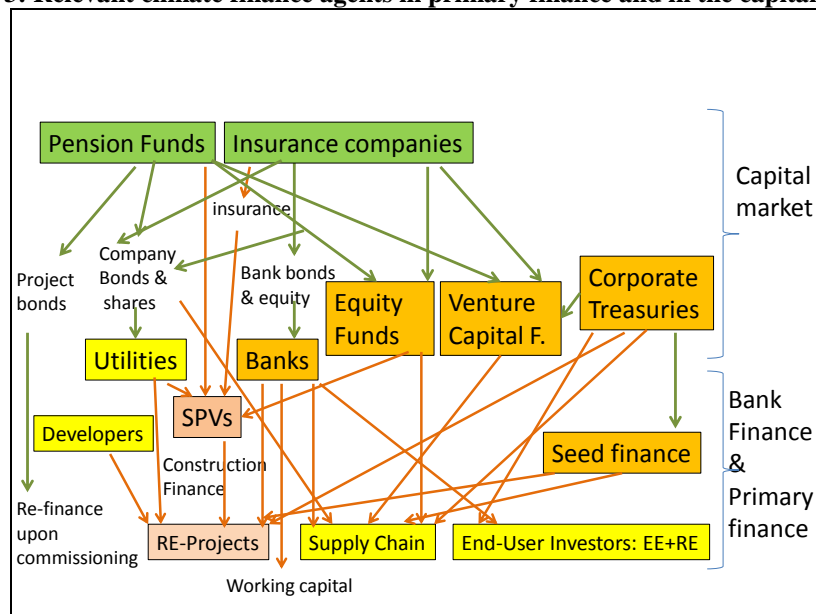
(PSF) of the GCF, is to assist both the ‘greening of the commercial finance sector in the developing countries’ as well the ‘development of a green supply chain’ – qualified project developers, consultants and providers of technology, product marketing and servicing of low carbon technologies.

2 The investor community in green finance

2.1 Overview of actors in primary finance and in secondary finance

The allocation process in climate investments starts with investment decisions in the real economy after which it enters into the appraisal and due diligence process in the finance sector. The finance sector has become increasingly heterogeneous during the last 20 years. But the chart below cuts the sector down to the investment community most relevant for climate finance.¹⁶ The finance agents from table 2 are included, except for the development banks.

Figure 3: Relevant climate finance agents in primary finance and in the capital market



Source: Author

The chart serves to structure the identification of what the key success factors are for achieving the green transformation of the finance industry, and where the GCF can act as gap filler.

The chart distinguishes between bank finance/primary finance – directly financing the development and implementation of an investment project – and secondary finance via the capital market.¹⁷ The coloring indicates the role of the agent in climate finance; in this case, RE and EE-investments. The *light yellow color* identifies originators of investments: project developers, power utilities, companies in the supply chain of clean energy technologies and services, and end user investors (households, commercial enterprises, public sector). The *yellow-brown color* points out the direct providers of co-finance in the form of debt or equity for the projects prepared by the originators: the banks (the primary intermediary of finance), private equity funds, venture capital funds, infrastructure funds (not shown in the chart), the treasuries of large

¹⁶ The shadow banking sector is, for example, left out. Shadow banks are financial intermediaries that conduct maturity, credit, and liquidity transformation without access to central bank liquidity or public sector credit guarantees. Examples include finance companies, credit hedge funds, money market mutual funds, securities lenders, limited-purpose finance companies, structured investment vehicles.

¹⁷ Definitions of capital market differ. Broad definitions refer to the market for long term finance in general; they, include long-term loans from banks. Others, including this report, limit it to the market for bonds and shares.

corporations. The *green color* indicates the so-called institutional investors who are active in the capital market purchasing bonds and shares and investing in equity-, venture capital-funds. The *light red color* shows the RE-project, either directly owned by the project developer/utility or by a special purpose vehicle - an entity established for obtaining off-balance sheet financing for a project. The *yellow-brown arrows* show direct finance flows. The *green arrows* indicate finance raised on the capital market.

2.2 Utilities, independent project developers and corporate entrepreneurs

Using the terminology applied in table 2, utilities, independent project developers and corporate climate entrepreneurs provided 35% of the climate finance in developing countries in 2011. Being originators / initiators of climate investments, they are of special importance to the PSF. Without their efforts and the investments by end-users, few climate investments would be made.

The energy utilities are the key actors in mitigation investments. They are involved: (i) in the greening of energy supply through investments in renewable energy and in increasing the energy efficiency of energy conversion and transport; (ii) in end-user energy efficiency through demand side management programs and (iii) in pilot and demonstration projects. (iv) as investors in the development of new technologies.

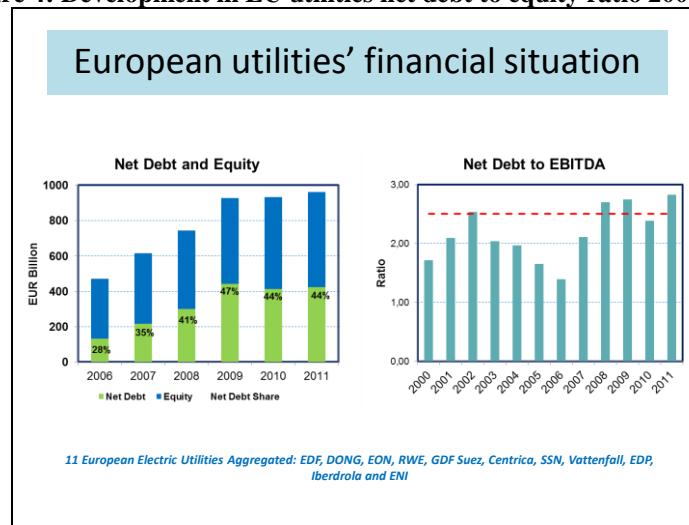
Utilities finance their projects mainly through corporate finance. Own-finance for construction comes out of net revenue, debt finance comes from bank loans and corporate bond issues. The due diligence of a bank for the loan request and the evaluation by a rating agency for the rating of a bond issue is concerned with the utility's creditworthiness: its solidity and liquidity situation. The specific risks of individual investments financed through corporate finance are not priced into the cost of corporate debt, except for their impact on the company's cash-flow situation and balance sheet. The ability of a utility to increase its investment volume through corporate finance, therefore, depends on the strength of its balance sheet. If the utility's annual investment volume increases faster than the growth in its net revenue, its debt to equity ratio will increase. Increase in the share of debt is an almost inevitable consequence when a power utility switches its investment policy from fossil-fuel based power plants (low cost of investment, high operating costs) to capital intensive renewable energy plants. The higher capital outlays come here and now, the higher annual cash flows from lower operating costs come in the future when the plants have been commissioned. A utility can invest in capital intensive climate-technologies only as long as its cost of capital is low, meaning that it must protect its investment grade rating.¹⁸ The maximum 'net debt to EBITDA' ratio accepted by rating agencies for award of investment grade rating to utilities is around 2.5. Once a utility passes that level, it risks being downgraded to non-investment grade status.¹⁹ Several larger energy utilities in EU-countries crossed the 2.5 ratio threshold in recent years as stagnating power demand led to a weak growth in utility revenue while the utilities increased their climate-related investments. From 2006 to 2009, the share of debt in the capital structure of 11 large utilities in the EU increased from 28% to 47%, as debt more than tripled from €130 billion to €440 billion, while equity capital less than doubled from €280 billion to €500 billion. See figure 4.

¹⁸ An investment rating level of minimum 'BBB-' from Standard & Poor's; or minimum 'Baa3' from Moody's.

Investment grade rating is essential to attract investments from regulated investors – the institutional investors (pension fund and insurance companies) and commercial banks.

¹⁹ EBITDA - earnings before interest, taxes, depreciation, and amortization. It is commonly used as an indicator of the ability of capital intensive industries to service debt.

Figure 4: Development in EU utilities net debt to equity ratio 2006-2011



Source: Danish Energy Association NEED presentation using data from Bloomberg

Because a lower rating increases the cost of new debt, energy utilities with ambitious climate investment programs must turn to the *project finance* model for their investments (and/or to raise more equity capital by an equity issue).²⁰ In this modality, long-term loans are approved based on the projected cash flows of the asset; the providers of debt have recourse only to the underlying assets of the investment as collateral.

The legal instrument for *off-balance sheet finance* is to ring-fence major new investments by setting up a *Special Purpose Vehicle (SPV)* to implement and own a larger new project. It is then the SPV, not the project developer (who may own the SPV 100%), which gets a syndicated bank loan²¹ to debt-finance the construction. Upon the entry into operation of the plant, the potential sources of project finance increase substantially. Reduced investment risk - the project development risk and the construction cost risk have been taken by the project developer - and reduced investment complexity - the assessment of a greenfield (new) infrastructure project calls for specialized expertise, which few finance institutions have – both widen the financial investor base. Expertise to assess a project bond is more widespread and is helped by the bond's rating, which reduces the due diligence undertaken by investors.²²

The widening of options increases the possibilities for long-term finance as exemplified by the options for the financing of the India Solar Park project, see the text box. For a developer, the easiest way to get all the permits and clearances in place, is to set up a grid-connected solar PV-project project in a government-backed solar park, where these are usually taken care of a priori. The construction is financed by a syndicated bank loan against the balance sheet of the corporation developing the project. After commissioning, however, the banks are willing to take their loans off the balance sheet of the developer and transferring the loans to a SPV created to own the project. Alternatively, the shift from corporate to project finance can be achieved by replacing the bank debt by bond debt.

²⁰ The alternative is to reduce the level of ambition. Early March 2013, RWE, the German utility gave up on its a target to increase the share of renewables in its portfolio to 20% by 2020, blaming difficulties in accessing funding.

²¹ In this a 'lead bank' arranges for consortium of banks to provide the loans to the project.

²² The rating agency is paid by the issuer for its service; a contentious practice introduced in the 1970s. Yet, its assessment process replaces the due diligence of the bond investor.

India solar park project – finance options

Option 1: syndicated loan finance in the form of a hybrid between corporate and project finance An *initial loan package* involving a range of lenders, which include domestic commercial and public sector banks, international commercial banks, export credit agencies, multilateral agencies and bilateral agencies, funds the cost of construction. The loans are expected to have maturities of 10 to 15 years. They become fully non-recourse once the individual plants have passed pre-defined performance tests.

Option 2: after commissioning, long-term debt refinancing through bonds. The high cost of bank debt in India makes it likely that refinance by a bond issue upon commissioning would achieve a reduction in the cost of debt. The bond would be orchestrated by a Solar Park finance vehicle. To reach the required scale for tapping the domestic and international debt capital markets, the bond would cover a portfolio of planned solar projects in the park.

Source: Bloomberg Finance

A project developer's value creation is in project preparation and development, not in operation. Selling equity in the SPV and investing the revenue in the development of a new project yields the developer a higher RoE than keeping his invested equity in the SPV. The reason is that a developer can charge passive investors a *project development premium*. The premium has two components: a '*scarce know-how premium*' for knowledge in project development and implementation, and a '*risk premium*' for taking on the project development and construction risk. A developer will operate and maintain the plant through a long term O&M contract with the SPV, but sell some interest in the project to portfolio investors.²³ Because investment in an operating SPV is a pure financial portfolio decision, shares in the project can change ownership frequently during the lifetime of an operating plant. The refinancing upon commission, therefore, serves two purposes: (i) to replace higher cost bank finance with lower cost bond finance²⁴ and (ii) to allow the developer to cash in his project development premium.

The independent project developers are a diverse category. Some are small, others are large, e.g. the Indonesian company Energy Star, which is involved in oil and gas exploration and development as well as in geothermal power plants, and can, therefore, tap the international bond market for capital.²⁵ Inter alia, they include manufacturers of RE-technologies who develop projects using their technology and sell their shares in the project upon construction.

Some project developers are supported by equity funds, some tap the market for *retail bonds*: bonds marketed to households and sold in small denominations to enable investors with little capital to invest also. Demand for retail bonds has developed in response to the low interest rates awarded by commercial banks on time deposits. Because small bond issues are not tradable on the capital markets, they are a very illiquid form of investment. They are intended to be kept by the investor until maturity; but can be transferred or sold by

²³ To reduce the investment risk for portfolio investors, the purchase agreement will oblige the developer to keep an equity interest in the project. Brookfield Renewable Energy Partners L.P. units issued in February 2013 a C\$450m, 17 year bond for its 166 MW Comber Wind farm in Essex County, Ontario. The wind farm began operating in 2011 and has a 20-year Power Purchase Agreement with the Ontario Power Authority. The bond, Canada's first broadly marketed and rated wind bond, was rated 'BBB' by DBRS and carried an interest rate of 5.13%. The bond was oversubscribed; 25 investors acquired bonds.

²⁴ The difference in the cost of capital can be small. The underwriting of a bond issue costs around 7 percent of the revenue from the issue.

²⁵ In February 2010, Energy Star raised US\$350 million from a 5yr geothermal bond offer; that bond had been 2.85 times oversubscribed. In March 2013 Energy Star raised US\$350m from selling 7 year dollar-denominated bonds at an interest rate of 6.125%. The bond, which received a B+ rating from Fitch was 11 times oversubscribed. Buyers were 46% from Asia, 33% from Europe and 21% from the US; 86% went to fund managers, 8% to banks and 6% to insurance and public institutions. The revenue will be used to finance the development of the Wayang Windu geothermal power plant, one of the largest in Indonesia. Source: Sean Kidney blog, March 30, 2013

direct placement, or through an over-the-counter sale by a bank. Since retail bonds are not sold to regulated finance institutions, such as pension funds, they are not rated. The retail investors, therefore, must have faith either in the company issuing the bonds or in the finance institution marketing the bonds to them. The retail market makes bond issues of very different sizes feasible: bond issues as small as US\$6-20 million have been launched in the UK, whereas retail bond issues of several hundred million US-dollar are feasible in Japan.²⁶ The low interest rates in China ought to provide a market demand for retail bonds as well.

Retail bonds offer a potential alternative to bank debt finance and to mezzanine finance by equity funds. But it is not a straightforward market to develop. The text box below summarizing the case of the 'Rebonds' launched by the British RE company *Wind Prospect Group*. It is an example of a bond issue that failed to raise the intended revenue despite terms that were quite flexible.

Green Company Retail Bond

The company *Wind Prospect Group*, a holding company, has developed and engineered wind-energy projects around the world since building the UK's second wind farm in 1992. The company is wholly owned by its 200 staff. The subsidiary *Wind Direct* markets green electricity directly to industrial and commercial clients, locating wind turbines on-site and supplying electricity direct to the client under a long-term (up to 10 years) fixed price PPA-contract (purchasing power agreement).

The project The funds raised by the offer were to be distributed by the *Wind Prospect Group* *Wind Direct*, or to other of its UK subsidiaries. The first £6m were to fund a 2 MW windfarm project at South Staffordshire College. Surplus output higher than the demand at the College is sold to the grid.

The bond In May 2011, *Wind Prospect Group* launched a corporate retail bond named *Rebonds* onto the UK market with the aim of raising £10m. The bond pays 7.5% per annum rate of interest, with additional 0.5% interest payable to bondholders that subscribe for £10,000 or more; minimum investment is £500. Interest is payable semi-annually until the original sum is repaid at maturity. At the bondholder's option, the repayment date is 4 years after the issuance date, or each anniversary thereafter. A bondholder must give at least 6 months written notice before the repayment date, when he/she wishes to be repaid.

Result: *Wind Direct* managed to raise just £2.3 million of the hoped for £10 million bond.

Source: Rebond invitation prospect and Environmental Finance, November 1, 2011

A bond issue is basically a loan given to the issuer which is repaid upon maturity. Yet, it can be used by an established developer to finance the 'equity capital' part of an investment program; where the debt/equity composition is typically 80%/20% or 70%/30%. The example in the text box below shows the case of *Ecotricity*, a renewable energy utility, which markets green electricity to consumers. Through an over-subscribed retail bond issue it successfully managed to avoid recourse to high-cost mezzanine finance to finance new investments in windfarm projects.

²⁶ Japan, where low interest rates on bank deposits have been around for a long time, was the first country to develop a retail demand for project bonds. The household demand for green bonds in Japan is large enough to provide a market not only for bond issues but also for *green asset management funds* that invest in green bonds collectively on behalf of the households investing in the funds. *Nikko Asset Management* has two funds that predominantly invest in *World Bank Green Bonds*.

Retail bonds to finance developer equity in wind energy projects

The developer In 2011, the UK renewable energy utility Ecotricity had 4,000 business- and 41,000 domestic customers and an operational RE-power capacity of 55MW of wind turbines, with 152MW in planning.

Conventional finance Ecotricity's RE-projects are typically financed with a mixture of 20% equity and 80% debt. Ecotricity raises the debt portion from the banks at around 6% rate of interest. Ecotricity could access *mezzanine debt* carrying a 13-15% interest rate to finance the equity portion of a project.

Bond finance Since 2010, Ecotricity has turned to retail *bond issues* as a lower cost way of raising finance for its equity needs. In December 2010, Ecotricity issued a £10 million bond with the intention in 2011 to build 20MW of wind and solar projects, investing a total of £35 million. 'Ecobond One' closed in December almost two times oversubscribed: both Ecotricity's retail customers as well as non-customers bid to buy £9 million worth of bonds. The company allocated 70% of the four-year bonds to customers paying these 7.5% in interest, and the rest to non-customers paying these 7% in interest.

Rating The bond was unrated. This handicap was overcome by the combination of a good 15-year track record, a good £44 million balance sheet and of interest rates far superior to bank deposits.

Impact Apart from raising capital, the bond issue served the strategic purpose of offering benefits to its customers and of advertising its existence to non-customers.

Source: Environmental Finance, November 2011

'Corporate entrepreneurs', business development units within established and well-financed technology firms, are a new and very unusual type of project developer in climate projects. They can engage in business innovation outside their company's core activity, conceiving and developing innovative mitigation and adaptation projects where the company has relevant technical expertise. An example, summarized in the text box below, is the 'CleanStar' investment in sustainable agro-forestry and ethanol production in Mozambique made by Novo Enzymes. The project, which replaces traditional charcoal cooking stoves with stoves fueled by sustainably produced bio-ethanol, integrates the whole value chain from primary production until the end-use of the processed products. The specific technical expertise of Novo Enzymes is enzymes for second generation biofuels, which is used in the part of the value chain, where cassava is transformed into biofuels. Novo Enzymes contributed not just the development of the innovative business concept, but also the ability to bring together a consortia of firms with complementary know-how to implement a complex project that cuts across sectors.

CleanStar Mozambique: integrated food, bio-energy production and forest protection

The company: CleanStar Mozambique (CSM) is a company formed in 2010 by the Danish industrial enzymes company Novozymes and CleanStar Ventures, an early stage developer of sustainable food & energy ventures.

The project. The idea of Novo Enzymes in 2008 was to develop large mono-culture farms producing transport biofuels for export to Europe. The focus changed to smallholder-based agro-forestry to produce ethanol-based cooking fuel for sale with the company's cookstoves in Mozambique's capital Maputo. The 2 million litres per year ethanol-based cooking fuel is produced from cassava supplied by local farmers. CSM transitions local subsistence farmers from slash-and-burn farming to more resilient conservation agriculture techniques involving synergistic cultivation of crops and trees to achieve a seven to eight times increase in their production and nutrition levels. CSM provides capacity building TA to participating farmers and basic inputs such as improved planting material and purchases their production surpluses (above own consumption) at five rural agricultural centres near in communities, where they undergo primary processing before being sent to CSM's integrated food and energy plant located in Dondo, Sofala Province. Surplus cassava is converted to ethanol-based cooking fuel, flour and chicken feed. Beans, sorghum, pulses and soya are processed into packaged food products for sale in Mozambique's cities.

Main collaborating partners ICM, a leader in ethanol process technology, helped custom-design, finance, build and commission the plant. Dometi, a Swedish stove designer, designed the stove, which is produced by Prometal, a local stove manufacturer. Zoe enterprises, Mozambique, is retailing partner.

Financing. The *seed finance* to the US\$ 20 million project came from Novo Enzymes, which invested US\$ 1 million in equity and further sums in the form of loan; a development fund contributed around US\$0.4 million in grant support for the development of the concept. In 2011, Bank of America Merrill Lynch, through a forward purchase of future CERs from the project, provided *upfront carbon financing*, which, inter alia, is used to finance the reduction in the price of the US\$60 stove to a retail price of US\$30. *Growth stage finance* came in 2012 from the Soros Economic Development Fund, which invested US\$6 million for a 19% stake in the project and from IFU (Industrialization Fund for Developing Countries), which invested US\$ 3 million for a 9.5% stake.

Impacts. CSM directly improves the agriculture value chain through its investment in production, warehousing, marketing and distribution. The rural smallholders experience improved nutrition and income increases of at least 300%. By 2014, the venture will involve 2,000 smallholders over 4,000 hectares; SMS will have 1,000 employees across Mozambique. The cooking fuel is by 2014 to achieve a 20% penetration in Maputo households, meaning 80,000 customers. The GHG reductions of replacing charcoal demand will be about 500,000 tons of CO_{2eq} per annum. Productivity of degraded agricultural land is improved, forests are protected, biodiversity is enhanced.

Source: websites and interviews of involved staff

For the GCF's goal of transformative impact, the 'entrepreneur' investor with basis in a high-tech company is of high interest because they can come up with totally new angles for the development of climate projects. Yet, it is difficult for staff to convince management to provide seed finance to such projects. Because their project development is a non-core area for the corporation, it is difficult for them to compete with funding requests for development projects within the firm's core activity. The grant finance of the initial development of the concept, may look modest, yet it was essential for getting the company's own seed finance approved by the chief finance officer.

2.3 Corporate treasuries as debt finance providers

The large cash-flows managed by the treasury departments of multinational corporations, have turned these into significant actors in the money and capital markets.²⁷ Corporations provided 7% of the climate finance in the developing countries and 33% of the finance in the developed countries. Unlike banks, the company treasuries provide both debt finance and equity capital to projects. They are both primary providers of capital (to project implementation) as well as investors on the secondary market (refinancing of investments). They can be divided into three broad categories.

One category is corporations making large scale investments in *end-user investments in energy efficiency and in renewable energy systems at their own premises*. In the USA, IKEA has become the largest non-utility investor in PV-systems by installing roof-top PV-systems on many of its buildings. In India, corporations are incentivized to invest in windfarms by favorable tax incentives and wheeling tariffs that allow investments in plants located far from the investor's center of electricity consumption. In China, the 10,000 enterprise program is forcing important investments in energy efficiency,

A second category is the so-called '*captive financiers*', energy technology companies like GE, Siemens and Schneider Electric, who have finance departments which co-finance investment projects by developers and by end-users that make use of their technologies. They use their financial strength as a competitive parameter in the product market by offering equity as well as debt finance at market competitive terms. In the present situation where investors' appetite for renewables is growing, but remain wary of technology risks, the captive financiers have an important role to play, not the least because they also offer to add insurance and maintenance services to their loans.

A third category is '*portfolio investors*', cash-rich corporations who cannot invest all their cash profitably into their core business activities and see investments into climate projects as a profit opportunity and as a contribution to socially responsive investment (SRI). Google has invested several billion US dollars in wind-farms and solar PV-power plants either by co-financing projects developed by others or by buying into operating plants. Google 'green investments' are profit driven and a means to reduce the climate footprint of its servers: cloud-computing is becoming an important driver in the growth of the global demand for electricity.

2.4 Small end-users

The investor category and the employed climate technologies are both very broad: households investing in roof-top PV-systems or solar water heater systems, SMEs and government investing in energy efficiency, farmers investing in sustainable farming practices, etc. As witnessed by the rooftop PV market in Germany and the solar water heater systems market in China, end-users can quickly mobilize finance for climate investments which yield a significant higher return than their term deposits in banks.

2.5 Commercial banks

Non-recourse finance from commercial banks - lending against the cash-flows and asset value of a financed project without recourse to the balance sheet of the investor - provided 6% of the climate finance in developing countries (table 2). The share is so low because more than 80% of the bank loans to climate projects in developing countries were given as *on-balance sheet finance*.

²⁷ During the 1990s and early 2000s, the finance arm of General Electric generated a higher contribution to the net profits of the company than all other GE-divisions combined. For tax reasons, US companies hold an estimated \$1.7tn of spare funds overseas; the source of the funds is non-repatriated profits to avoid US taxation.

The ability of banks to increase their engagement in off-balance sheet finance, depends first of all on the *capacity of banks to increase their project lending*. Present re-capitalisation pressures on the banking sector in OECD countries make banks less willing to hold long-term assets, such as renewables, on their balance sheets. New banking regulations make borrowing more expensive for developers of RE projects. The ‘net stable funding ratio’ (NSFR), a new proposed measure in Solvency II of banks’ financing solidity, forces banks to match the duration of their funding and lending more closely, reducing the liquidity and maturity mismatches between its assets and the liabilities used to fund them. Basel III²⁸ increases the capital charge for banks holding long-duration loans raises. This increases the cost of issuing long-term corporate and project finance loans above the cost of issuing mortgages and short-term loans²⁹ and provides an incentive to sell long-term financial assets rather to make new project loans. While there is credit capacity to finance a sizeable amount of short term construction risk, lending will remain constrained unless banks have an exit option for their loans via a securitization of loans on the capital market.

The clogging of a financial artery is a particularly serious problem in countries where the finance sector is insufficiently deep and liquid. Despite progress, this is still the case in Asia: of the top 50 banks in the world, only six are Chinese and none of them are from India.

Because of India’s fiscal deficit, widening current account deficit and weak currency, the country has to import capital, which is ever more costly. India’s banks aren’t sufficiently capitalised to support the country’s growth; most private Indian banks lack the financial strength to expand lending aggressively. The loan to deposit ratio at all Indian banks adjusted for restructured assets is already more than 100 per cent and some public sector banks have dangerously large exposures to struggling infrastructure projects. Three quarters of Indian banks are majority owned by the government, which is not in a good position to help them recapitalize given its weak finances. Standard & Poor’s is looking at downgrading India to junk status. As a result, India’s banks can provide little of the long-term money for needed infrastructure projects and lending to SMEs is tight.³⁰

In the past, thanks to China’s rapid economic development, China’s banks managed to increase their good assets to keep the proportion of bad loans small. But with the economy slowing, the excessive credit growth of recent years may prove problematic. Bank of China, for example, grew its loan book 49 per cent in 2009 alone.³¹

In this situation, one must expect that the trend towards “disintermediation” – getting rid of the banking middleman – which is seen in Europe and in Asia will continue. Many banks, weighed down by large

²⁸ Basel III, the Third Basel Accord, is a global regulatory standard on bank capital adequacy, stress testing and market liquidity risk agreed upon by the members of the Basel Committee on Banking Supervision in 2011. It is scheduled to be introduced from 2013 until 2018.

²⁹ Source: Group of 30 (2013)

³⁰ The dearth of SME-finance is a problem also in EU-countries post 2007, and a difficult one to solve. The UK Government made several attempts to ease business credit. (i) In 2009 came the Enterprise Finance Guarantee scheme, which offered banks a government guarantee worth 75% of loans to small businesses, lowering the risks faced by the banks. Lending continued to plummet. (ii) In 2011, the “Project Merlin” agreement between the Treasury and the biggest lenders aimed to provide £190 billion of new credit to businesses. But the reduction of old loans outweighed the new ones: despite £215 billion in new loans, net lending declined again. (iii) Late 2011 came the National Loan Guarantee Scheme, which uses government guarantees to lower the cost of banks’ borrowing from markets. Yet, more lending contraction. (iv) In August 2012 the Funding for Lending Scheme (FLS) was introduced. Banks can borrow from the Bank of England at cheap rates, lowering their funding costs. Access to cheap funds is set at 5% of the current stock of lending (that is, at £80 billion) and increasing in line with any new business loans. Source: Financial Times, February 7, 2013

³¹ Source: Financial Times, January 9, 2012

holdings of souring debt, are now seen as less creditworthy than the companies that are coming to them for loans. As an alternative to lending the money themselves, banks are instead acting as a credit broker, matching up investors such as pension funds with cash-hungry companies via a bond issue.

2.6 Private funds

2.6.1 Venture capital funds and private equity funds

The term private equity is used generically to include venture capital, growth capital, buyouts and special situations funds. In this report, except when defined otherwise, the term ‘private equity’ refers to funds investing in ‘growth capital’ to distinguish it from ‘venture capital’ funds which provide development capital. Buyouts and special situations fund are of little interest to climate finance.

From very few deals in 2000, climate friendly investments by PE and VC firms grew to US\$ 20 billion per year in 2010.³² Less than 10 percent of climate friendly deals took place in emerging economies, and of these more than 80 percent occurred in India and China.³³ An example is Berkeley Capital, which raised \$74 million for its Renewable Energy Asia Fund (REAF), which invests in small hydro, wind, solar power, and biomass in India and other developing countries in Asia.

As documented by the data in table 2, the US\$20 billion financial contribution is a tiny fraction of climate finance.³⁴ To some extent the low share in climate finance can be explained by the short-term nature of their business involvement. Private equity funds identify going businesses with promising revenue growth and/or unexploited productive potential, invest in these, manage them (directly or through participation on the Board) during the growth and/or restructuring phase, and after 5-6 years, sell their equity share at a profit.

The low participation also reflects the ‘immature stage’ of the capital markets in emerging economies. That situation is changing rapidly. The share of global *private equity fundraising* in emerging markets quadrupled from 5 per cent in 2003 to 20 per cent in 2012, as the financial volume increased from a few hundred million dollars in 2003 to US\$18 billion in 2012. In China funds raised US\$11 billion, next in size was India with US\$ 2 billion.³⁵ Private equity fund raising surged until the outbreak of the financial crisis in 2008, followed by a sharp drop in 2009 and 2010. In China a new surge occurred in 2011, to be followed by another reduction in 2012. In India, the downward trend in new fund raising continued all years post-2008. See Figure 12.

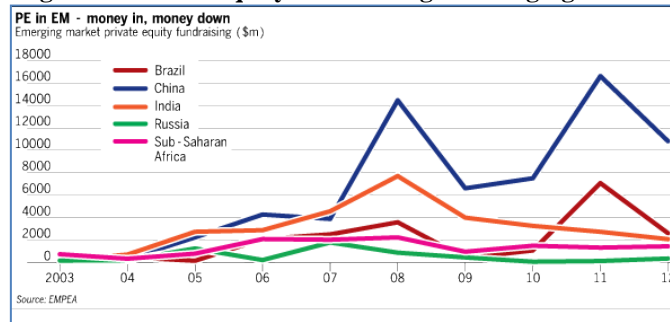
³² Source: IFC: “Public Privat Equity Partnerships: Accelerating the Growth of Climate Related Private Equity Investment”, 2011

³³ IFC (2011)

³⁴ On the capital market (market for long-term finance) one distinguishes between ‘private companies’ and ‘public companies’ (or ‘listed companies’): the latter are listed on a stock exchange, the former are not. Private equity firms, as the name indicates, invest equity in ‘private firms’. If they purchase the stocks of a company listed on a stock exchange, they do it to ‘take the company private’, meaning that it is delisted from the stock exchange once the equity firm has acquired a sufficiently high percentage of all shares to be allowed to do so without approval of remaining stockholders.

³⁵ Source: Financial Times:” Chart of the week: the growth pains of EM private equity”, February 11, 2013. “China saw in 2011 a surge in fundraising from both international and local renminbi funds – the latter accounted for just under half of the funds raised. Wealthy individuals make up the bulk of renminbi investment in Chinese private equity funds, as government regulation bars pension funds (and until recently insurance companies too) from investing in them.”

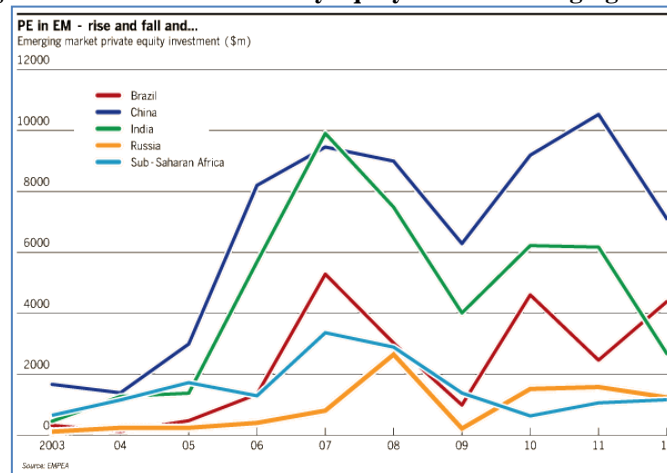
Figure 5: Private equity fund raising in emerging markets



Source: Financial Times, February 12, 2013

A look at figure 13, which shows the level of *equity investments* by the funds, reveals the reason for the decline in fund raising: there are not enough deals in China and in India to invest the money profitably. The equity funds in Asia sit on more than \$100bn of non-invested funds.

Figure 6: Annual investment by equity funds in emerging markets



Source: Financial Times, February 12, 2013

The data include buyouts and special situations funds, which are irrelevant for climate policy. Nevertheless, the large volume of idle investment capital in the funds underlines the general point that there is no shortage of capital for *profitable* climate investments.

Yet, many climate finance experts had made a case for ‘public finance’ investments in private equity funds.³⁶ The argument was that climate entrepreneurs faced problems in finding development- and growth capital and that project development by inexperienced project developers was too slow and of too poor quality. Specialised private equity funds for climate investments could assist entrepreneurs with capital and critical management expertise. Investments in ESCOs was considered an important activity to develop in energy efficiency. It was claimed that investments in private equity specialising in the climate sector was held back by the newness of the sector, which led to extra high RoE requests by investors which could not be met by projects in the sector. However, the publicly financed private equity funds, which started to be created after

³⁶ IFC (2011) is a typical document. A table using data from Mexico shows the needed distribution of investments by sector: Clean power infrastructure: 33%, Energy efficient devices and processes: 43%, Land use (forestry and agriculture): 10%, Infrastructure investments that reduces the need for energy (mass transit), 14%.

2004, faced the same difficulties in closing deals as the privately financed funds. Some of the public-private funds burned capital by investing in Chinese technology firms in clean energy. The “copy” phenomena in Chinese business - as soon as a Chinese investor develops a new business model, others quickly copy the concept – led to over-supply and depressed profits in Chinese clean-tech.³⁷

The question is whether the idle capital/dearth of deals is caused (i) by the absence of potential demand?³⁸, (ii) by the difficulty in finding capable fund managers with a credible record in their chosen field? or (iii) by the high management costs of equity funds: fund managers charge an annual management fee of around 2% on committed capital - not investment³⁹ - and a performance fee of 20% of profits beyond a fixed rate?⁴⁰ The high costs forces the funds to look for very high yielding investment, which reduces the range of feasible investments.⁴¹ Equity funds have been under attack by conventional investors because of their high fees and because research has shown that the average fund after deduction for fees does not generate higher returns for investors than passive portfolio funds.

The situation of high costs and under-performing fund managers offers an opportunity for newcomers to enter, who can improve the performance of private equity funds on both quality and costs. An example is the venture capital fund ESB Novus Modus LP, which was set up by the Irish semi-state owned utility ESB in 2009 with a capital of 200 million. ESB is the type of newcomer, who ought to have a comparative advantage in setting up clean energy funds. It is involved in power generation, transmission, distribution and supply; provides energy efficiency services to consumers as part of mandated DSM-programs and has built and owns Ireland's national fibre optic network. It, therefore, has in-house staff with broad technical expertise in clean technology. The business idea for the fund, which has no staff, is to combine the technical expertise of ESB staff with the deal making expertise of the staff in Greencoat Capital, a private equity house working exclusively for ESB in identifying and concluding investment deals for Novus Modus, which was set up jointly by ESB and the partners of Greencoat Capital. Novus Modus is an interesting example of how private investors seek to find *underserved investment niches*. It seeks investment objects that are ignored by *venture capital funds* for being too big and too complex, while *private equity funds* providing capital for the growth stages of a company shy away from them due to technical and regulatory risk. The fund is summarized in the text box below.

³⁷ China installed t 14 gigawatts of wind capacity in 2012. Yet, not a single Chinese wind turbine maker was among the world's top 10 manufacturers, as 25 Chinese turbine makers struggled to share the market.

³⁸ One explanation given for the dearth of deals is the reluctance of family owned businesses in China and other Asian countries to accept ‘active’ third party equity.

³⁹ The payment structure entices some private equity managers, waiting for the right opportunity, to have money languishing uninvested.

⁴⁰ The absence of competition in pricing is particularly contentious, since almost all of the ‘alpha’ or market outperformance in private equity funds is due to a small number of elite firms in the top quartile, yet mediocre or poor firms apply this fee formula and are able to charge it!

⁴¹ A further factor which limits deal-making is that it is still difficult to get out of an investment in most Asian developing countries, particularly, if it is to be done through a listing. Fund managers, therefore, also assess project proposals by the ‘liquidity-quality’ of an equity investment.

ESB Novus Modus LP cleantech fund

Fund investor: ESB

Fund size: €200 million

Investment area: Project developers as well as technology developers in the clean energy and energy efficiency sector. Investments are usually €3 to €20 million equity investments with significant minority positions, board representation and a 5 to 6 year investment horizon. Basic premise is to cover lack of financing between the venture capital (too big and complex) and private equity (too much technical and regulatory risk) stages.

Investment advisor: Greencoat Capital, a venture capital and capital development firm with offices in London, Dublin, and Munich. It invests on behalf of ESB. The staff of 13, three of which are former ESB staff, comprises 6 partners and 7 associates. (The fund has no employees).

Involvement of ESB technical experts: ESB's teams in wind, electric vehicles, biomass, wave, smart grid, smart meter, ESCO and other core utility sectors are drawn upon for technical back-up support.

Examples of investments: €6m investment in Heliex Power, a company that's developing technology to harness electricity using waste steam from industry. €12m into Tenksolar, a solar panel maker. €3 million in Intune Networks, a developer of high-performance laser technology for the telecoms industry; with potential of halving the energy consumption of fibre optic networks. US\$13.3m in UK firm Geothermal International (GI), Europe's largest designer and installer of Ground Source Heat Pump (GSHP) systems for the acquisition of Chicago based Endurant Energy, an energy consulting, procurement, development and services firm and a leader in the implementation of Combined Heat and Power ("CHP") systems for the commercial and institutional sectors. The combination creates a full-service energy firm, providing master planning, energy project development, utility procurement, financing and maintenance services throughout North America.

Source: Websites of ESB, Novus Modus and Greencoat Capital

ESB's concept of setting up an empty shell fund with no management staff and having the investments managed by an investment advisor, may, however, not lead to a reduction in fund transaction costs. A conventional equity fund manager would charge €4 million in annual fees for managing the fund plus 20% of profits above a minimum performance rate. Novusmodus's chairman and managing partner received of €744,443 in 2011 (more than twice the earnings of ESB's own CEO), two other partners pocketed €1.43 million between them.

2.6.2 Infrastructure funds

Some infrastructure funds provide risk capital in the form of equity and mezzanine finance to project investments. Other funds specialize in debt finance for infrastructure, acquiring infrastructure loan portfolios put up for sale by bank or directly identifying and managing investment-grade infrastructure debt.

The funds can be a vehicle for involving institutional investors in sector finance: the traditional exposure of institutional investors to infrastructure investments has been through private infrastructure funds. Participation in the funds serves to increase the financial investor's understanding of a new asset class. Because of the long-term and relatively low risk nature of the assets they invest in, infrastructure funds ought to attract considerable investments from institutional investors and be able to channel large amounts of finance into climate projects.

However, table 2 showed the contribution of infrastructure funds to climate finance to be negligible. This poses a structural problem for climate finance. In principle, long-term finance should be supplied by entities with committed long-term horizons, not by banks. Commercial bank loan maturities average only 2.8 years

in emerging economies and 4.2 years in developed economies—far shorter than bond maturities - bank lending, including finance for infrastructure, accounts for 75 percent of financing in China.⁴².

One reason is costs. Although infrastructure investment is not an area with a large upside potential, the fund managers charge the conventional '2%+20%' fee structure of equity funds. This hits the rate-of-return for institutional investors to such low levels that their interest in investing is diminished.

Another reason is that a better alignment of interests between pension funds and the infrastructure industry is needed in terms of the structure of funds (which are too concentrated on specific sectors); and the investment horizon, which is too short: funds are set up with an 8 years investment horizon.

The reaction of institutional investors, with an interest in a larger exposure to infrastructure investments in their portfolio, is to look for direct investments in infrastructure. Since direct infrastructure investments are new territory for pension funds, the funds are experimenting with identifying what kind of platform can minimize the transaction costs and maximize their net returns. Different strategies are used.

One is *private equity co-investment*. The infrastructure funds respond to the preference of institutional investors for direct investments in the asset class by offering investors in the fund co-investment opportunities for project equity investment in projects the funds invest in. Offering co-investment rights enables private equity funds to secure commitments and access larger deals. For pension schemes, the investment is a package, under which a portion of the investment goes to the private equity fund, the rest goes directly into the same projects in which the funds are investing. The combined investment incurs a fraction of the fees. The strategy enables the pension schemes to build an origination network of private equity managers. Co-investing also gives better information about portfolio exposure, enabling the pension schemes to better tailor their exposure.

A second is setting up *infrastructure funds directly owned by institutional investors*. An example is the *Pension Infrastructure Platform* concept for direct investments developed by a trio composed of the UK Treasury, the £11-billion Pension Protection Fund (PPF)⁴³ and the National Association of Pension Funds (NAPF)⁴⁴. It is summarized in the text box below. The initiative was driven by concern about the ability of pension funds to cover their pension obligations in a low return environment.

Pension Infrastructure Platform (PIP)

Legal status: The PIP is a not-for-profit company focused on providing returns to its investors.

Projected lifetime: 25-years

Investors: PIP has the backing of around 10 UK pension funds.

Investment target: Direct investments in infrastructure projects

Targeted investment volume: PIP will launch as a fund in January 2013, targeting £2 billion (\$3.2 billion) worth of projects.

Targeted return: The target return is the retail-price-index plus 2%–5% per annum over the projected 25-year life of the fund.

Fund management: The PIP may be run by staff seconded by the pension funds or by fund managers on management contracts.

Source: Various

⁴² Source: Group of 30 (2013)

⁴³ PPF is protector of 12 million members. It pays out on schemes which employers fail to meet.

⁴⁴ NAPF counts 1200 pension funds as members, with a combined US\$1.3 trillion in assets.

A third strategy, restricted to the larger pension funds, say, those with more than US\$25 billion in assets, is to *invest directly through in-house investment teams*. This has been done by Danish pension fund PensionDanmark. Furthermore, to accelerate their direct investments in infrastructure, including renewable energy and energy infrastructure, they have undertaken a ‘*managed fund*’ initiative that is expected to enhance the deal flow but at much lower investment costs as compared to investing through a traditional infrastructure fund.

Managed Fund initiative of PensionDanmark

Financial volume: In the autumn of 2010, PensionDanmark set a target of investing an additional US\$2 billion in renewable energy and energy infrastructure during the next four to five years.

Objective of the concept: PensionDanmark uses two approaches to enhance the deal flow and create a better risk diversification across asset types, geography, etc. .

- Half of the US\$2 billion will be invested by the internal investment team which has previously closed deals on on-shore and off-shore windfarms in Europe and in the US.
- The other half is placed into an infrastructure fund managed by Copenhagen Infrastructure Partners, where PensionDanmark is the sole investor (limited partner). Copenhagen Infrastructure Partners is managed by four managers with a strong track record in clean energy investments. All four were as previous staff at Dong Energy, directly involved in the development of the Anholt farm financing structure.

Source: Various

An example of a direct investment in an infrastructure project, is the investment by two Danish pension funds into the special purpose vehicle created for the ownership of the Anholt off-shore windfarm. The Anholt financial structure is the first example of an investment by institutional investors into the construction phase of a windfarm. It is described in Annex I.

2.6.3 Development banks

In climate finance, development banks play a huge role. 37% of the climate finance in the developing countries in 2011 came from development banks, mainly from the national ones. Their development mandates leads them to perform several strategic functions:

- (i) A pioneering role in getting new climate finance products introduced on the market combined with TA to finance institutions in adding climate finance to their product portfolio.
- (ii) A bank syndication role to finance large scale and ‘risky’ investments.
- (iii) A gap filling role in risk capital, e.g. subordinate lending.
- (iv) A subsidy conduit role, channelling government grants to eligible climate investments.
- (v) A back-up finance role to maintain a minimum level of investments in times of a general financial liquidity crisis.

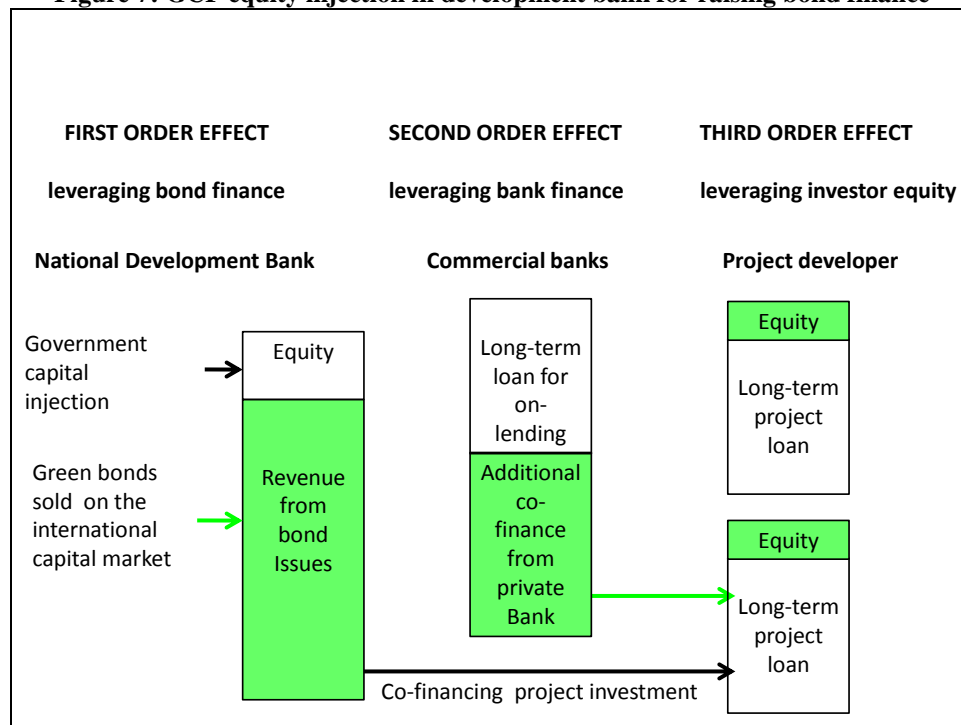
Some NDBs operate only in their home country, others finance projects also outside their country.⁴⁵ All NDBs depend on capital injections from the state budget for their equity capital; although some have managed to add to their equity from operating surpluses. Some NDBs enjoy ‘AAA’ rating enabling them to

⁴⁵ The Industrial and Commercial Bank of China (ICBC), for example, agreed in March 2013 to provide ZAR20 billion (\$2.17 billion) of loans for South African renewable energy projects.

tap the international capital markets for their debt finance. NDBs not enjoying investment grade status depend for their debt finance on loans from the state budget, from donor agencies or from MDBs.

The investment grade NDBs are efficient vehicles to raise finance from institutional investors in developed countries – the most coveted investors in international green finance - and channel it to green investment projects in developing countries.⁴⁶ Private finance is mobilized along the way from the bond issue to the final recipient, the green project investor. The two or three stages mechanism of is illustrated in figure 7.

Figure 7: GCF equity injection in development bank for raising bond finance



Source: Author

The process starts with a Government's equity investment in its NDB. The equity injection reduces the debt-equity ratio and thereby the NDB's ability to source additional debt. This leads to the mobilization of private finance on the capital market through sales of a green bond issue. The second order effect is achieved when on-lending loans to private banks are made conditional on matching co-finance from these, or when the participation of the NDB in a syndicated loan attracts the participating private banks into project finance. The third mobilisation effect comes from the equity capital which the project initiator puts into a project, which in the absence of NDB-finance would have been blocked by lack of access to commercial debt.

The NDBs vary in size and in scope. The extremes are illustrated below in the two boxes summarizing the involvement of IREDA and of BNDES, respectively. BNDES is a developing bank for investments in any sector of priority for national economic development. IREDA is a quasi-finance institution narrowly specialized in clean energy investments.

⁴⁶ In February 2013, the Export-Import Bank of Korea (Kexim) issued its first 'green bond', US\$500m in size with a 5 year tenor and a coupon of 1.75%. The bond launch is managed by SEB and Bank of America Merrill Lynch. This is the first benchmark-sized bond marketed as a green bond outside the multi-lateral development banks.

BNDES is the second largest development bank in the world and second as provider of climate finance in 2011. Only the China Development Bank is bigger in both aspects.

Brazilian National Economic and Social Development Bank (BNDES)

Business BNDES, established in 1952 has a broad mandate: to provide long-term financing for endeavors that contribute to the country's development. It explains its broad sector presence: BNDES financed large-scale industry, SMEs, infrastructure, mass transportation, agriculture, commerce, service industry, social investments in education and health, family agriculture, basic sanitation. RE-lending amounted to US\$2.4 billion in 2007, US\$7 billion in 2008 and US\$6.4 billion in 2009.

Low cost finance for RE-investment promoted by government programs

Government programs: BNDES financing of RE-power projects and bioethanol plants is part of the Government's tender programs for RE-projects: the PROINFA program from 2002 to 2008 and ANEEL's tenders for RE-power, started in 2009, which establishes the PPA-tariffs for winning bidders through the so-called reverse auction procedure.

Policy objectives for BNDES finance. One is to keep down the cost of RE-power tariffs. The other is to promote foreign investments in the RE value chain: to benefit from subsidies and BNDES finance, projects under PROINFA had to fulfill national content requirements: Law 10762 mandated a minimum nationalization of 60% in total construction costs.

Finance terms: BNDES can finance up to 70% of capital costs of RE-projects (excluding site acquisition) at the basic national interest rate plus 2% of a basic spread and up to 1.5% of a risk spread. Interests are not charged during construction and tenor is 10 years. Loans to RE power generation projects have interest rates at 1.4% below those practiced for coal or oil thermal plants and longer repayment terms: 16-20 years for renewable energy versus 14 years for conventional plants. BNDES' participation in renewable energy projects can reach, at maximum, 70%-90% while, for coal or oil thermoelectric plants it is at 50%

Impact of finance terms: BNDES reduces borrowing costs for eligible wind projects by roughly 40%. According to BNDES' analysis, its financing offerings have contributed to a 25% decrease in renewable electricity tariffs during the 2003-2011 period.

Results: Towers, nacelle boxes, hubs and blades are produced locally for the Brazilian market; these wind turbine components range from low to medium technology. High technology components, such as gearboxes, nacelle components and transformers continue to be imported. Manufacturers who already had a manufacturing base could comply with the requirements, newcomers faced delays in getting local production going. BNDES responded with inspections and withdrew the certification for local content from five producers in March 2012, all newcomers. These firms can recover their permits over the course of the year, but have missed out in the business for more than six months.

The "ABC" program: Programa para Redução da Emissão de Gases de Efeito Estufa na Agricultura

Fund size: BNDES launched in 2010 a 1 billion reais (\$588 million) fund that will finance projects to reduce greenhouse gas emissions associated with agriculture.

Supported investments: The "ABC" program provides low interest loans to farmers and cooperatives to recover degraded agricultural land, implement projects that integrate forests into cattle and crop production, establish and maintain forest plantations on abandoned agricultural lands, and restore legal forest reserves for permanent protection.

Finance terms: BNDES lends up to 1 million reais (\$588,000) at 5.5 percent, the lowest rate charge by the bank, per year to individual farmers and cooperatives.

Source: Various, including CPI

Compared to a non-bank financial institution like IREDA, the advantage of a broadly based development bank like BNDES and the associated large size of annual lending is, that a shift in the lending portfolio can channel considerable resources to a new priority sector with relatively short notice. This is what happened in RE in Brazil. But it also means that a shift in political priority can lead quickly to a substantial withdrawal of finance from a sector previously enjoying political attention.

IREDA, India Renewable Energy Development Agency, was set up in 1987 specifically set up to support investments in clean energy.⁴⁷ During the 1990s and early 2000s, nominal interest rates on the finance markets in India were very high because of high inflation. IREDA was used by bilateral donors and by MDBs as a vehicle to channel low cost project finance to investments in clean energy technologies, such as wind farms. IREDA's access to loans at concessional rates allowed IREDA to offer loans at very competitive rates. The demonstration effect of IREDA's initial investments had an impact on the willingness of commercial banks to engage in climate finance. As falling inflation brought down the nominal interest rates offered by commercial banks, IREDA lost its competitive edge in the pricing of its products, and, consequently market share. IREDA now needs to charge interest rates and fees at close to market rates in order to survive as a viable lending institution.

IREDA, a quasi-development bank for clean energy

Business purpose. IREDA was founded in 1987. Its business purpose is the promotion of environmentally friendly energy generation. IREDA is a Public Limited Government Company under the administrative control of Ministry of New and Renewable Energy. IREDA, is a specialised financial intermediary, which operates a revolving fund for promoting and developing clean energy projects. During the fiscal year 2008-2009, IREDA disbursed INR 7.7 billion. IREDA receives its funds from loans from development agencies and IFIs, and from loan repayments from clients.

Finance products IREDA offers project financing of up to 80% of project costs, equipment financing of up to 75% of equipment costs and other types of medium to long term debts (up to 10 years) with interest rates in 2010 in the range of 10.25% to 12%. IREDA introduced initiatives to help overcome credit availability barriers in the rural market for solar PV systems, including arrangements for leasing systems and providing loans for PV through existing micro-finance organizations. IREDA also assists the State Bank of India, Canara Bank, Union Bank of India, Bank of India, and Bank of Baroda to formulate schemes for EE lending to small and medium enterprises and is in the process of extending special lines of credit to state electricity boards to implement projects to renovate and modernize thermal power stations.

Impacts: Many commercial banks now play an active role in the financing of the established forms of RE (wind energy, solar PV) in India. While IREDA was almost the only lending institution in this field originally, IREDA's market share in the area of financing RE has decreased to 13 % in the financial year 2007/08 and to a mere 8.6 % in wind energy. But IREDA needs continued presence in the established subsectors in order to generate income with which to promote less established, higher risk sectors such as concentrated solar power plants and other new RE technologies.

Source: Various

2.7 The secondary market for finance: who invests in green bonds?

A specific sub-category of bonds, the so-called *climate bonds/green bonds*, are issued to raise capital to fund specific projects aimed at reducing climate change risk.⁴⁸ Some are green *company bonds*⁴⁹ others are green *project bonds*, asset-backed securities backed by the cashflows generated by a climate project or by a portfolio of climate projects. *Issuers of green bonds* include RE-project developers, development banks⁵⁰.

⁴⁷ IREDA is a 'non-bank financial company' (NBFC) under Indian law. NBFCs are financial institutions that provide banking services without meeting the legal definition of a bank, i.e. they do not hold a banking license

⁴⁸ The green label calls for certification. The Climate Bond Initiative is developing a Climate Bond Standard, designed to certify the environmental integrity of the underlying projects being financed.

⁴⁹ A corporate bond is essentially a loan to the company, under which the sum invested by the bondholders will be repaid at maturity.

⁵⁰ The funds raised from green bonds issued by the World Bank are ring-fenced for World Bank funded climate change projects such as energy efficiency, renewable energy and reforestation. The World Bank issued its first green bond in

commercial banks⁵¹, state governments in the US⁵² and municipalities⁵³. By early 2011, some US\$12 billion of bonds backed by investments related to climate change solutions had been issued internationally.

The green bond label is targeted at ‘socially responsible investors’; either pension funds with a commitment to hold a certain percentage of its portfolio in the form of assets considered to be of high social value, or, households with a preference for climate friendly investments. The commitment ensures a ‘guaranteed outlet’ for large green bond issues. But contrary to expectations of some proponents of green bond issues, the preference is normally not expressed in a willingness to pay a green premium for the bonds; prices tend to reflect the value expressed by the rating of the bonds. However, Kexim’s US\$500 million bond issue in February 2013, the first benchmark-sized bond marketed as a green bond outside the multilateral development banks, achieved a green premium of 9 basis points, despite the fact that 30% of the bonds were purchased by mainstream investors, see the text box below.

Korea Export-Import Bank’s \$500 million green bond issue in February 2013

The Bond: Kexim’s first ‘green/climate friendly bond’ US\$500m, 5 year tenor, coupon 1.75%.

Green quality: Kexim will use the proceeds to extend loans to projects that promote the transition to “low carbon and climate resilient growth” - projects that foster clean sources of energy, such as wind, hydroelectric and solar power; lower the dependence on fossil fuels; reduce carbon emissions or filter waste, such as water treatment projects. The Centre for International Climate and Environmental Research in Oslo (CICERO) is to vet criteria for projects to be funded by the Green Bonds.

Kexim rating: AA3

Size of demand: 100 investors had a total of US\$1.8bn of orders for the US\$500m.

Green premium: A green premium of 9 basis points to existing Kexim 5 year bonds, despite no difference in the credit characteristics. The Green Bond was priced 95 basis points over US Treasury 5 year bonds; outstanding Kexim 2018 bonds traded that day at 104 basis points over US Treasuries.

Regional distribution of investors: US investors 47%, European investors 32%, Asian investors 21%.

Break-down of investors by type: 55% to asset managers, 31% to banks, 5% to insurance and pension funds, 4% to companies and 5% to ‘other’ investors.

Share of ‘green investors’ (such as responsible investment funds): 70%. (Mainstream investors: 30%)

Source: Sean Kidney blog: “Korea Eximbank raising \$500m green bond”, 20 February 2013

Despite the huge financial resources in Asia, the demand for green bonds in Asia is still low: Asian investors took only 21% of the bonds. The institutional investors purchased a tiny 5% of the bonds, asset managers an astonishing 55%. Much discussion in climate finance centers on the need to increase the share of institutional investors in green climate finance. But considering the difficulties so far, it may be more productive to focus on marketing green bonds to a broad category of investors. In addition, this report

2007, since then, the EIB, ADB, AfDB, and NIB have issued green bonds as well. IFC’s USD 1 billion green bond launched in February 2013 is the largest issue so far.

⁵¹ An example is the Dutch/UK bank Triodos. It has branded itself as a green bank willing to invest directly in renewable energy projects; and raises capital explicitly for that purpose through retail climate bond issues.

⁵² Several US states also tap into this market to finance loan programmes for RE&EE investments by residential and commercial property owners. The programmes allow residential and commercial property owners to borrow the money for RE&EE investments from the state. The liability to repay the loan is attached to the property, rather than to the individual, as an assessment on real property. Loans are repaid over time through an annual assessment on their property tax bill.

⁵³ Kommunalbanken Norway (KBN) is a bank collectively owned by the Norwegian municipalities to serve their needs for project finance. KBN launched in 2011 a US\$180 million ‘Clean Energy Bond’ on the Japanese uridashi market (non-JPY denominated bonds sold directly to Japanese individual investors), the proceeds of which will be used to finance Norwegian municipal initiatives to reduce climate change.

expects that institutional investors will show a larger interest in green infrastructure bonds located in home countries or in neighboring countries.

2.8 Implications for the GCF

2.8.1 Observations drawn from the review of actors in the finance chain

It is evident from the review of the actors of the finance chain that some of the arteries in the *climate finance chain* are not flowing well.

Some major project originators see their financing channels getting clogged due to weak balance sheets and must seek finance from alternative sources on the capital market. Tapping the international market for green bond finance is quite common now for originating investors in the developed countries. In view of the vast financial resources in Asia, there is an untapped green finance source in developing countries for the PSF to develop. Interesting examples exist in developed countries of green retail bonds being used by project developers to finance acquisition of green assets as well as greenfield investment. In view of the huge household savings in Asia, the PSF ought to investigate the feasibility of developing national markets for green retail bonds.

Small investment volumes at the present stage of market development and the *novelty risk* (technology, market, business models) of investments in the sector deter finance institutions from dedicating resources to the development of specific finance products for the sector.⁵⁴

Private actors contributed 90% of climate finance in the developed world, in the developing countries only 52%. The priority candidates for increased engagement of private sector agents in ADB client countries in climate finance can be identified in table 1:

- (i) to get ‘commercial banks’ more involved in project finance (four out of five projects were financed on a balance sheet basis);
- (ii) to increase the participation of ‘corporate actors’ and of ‘institutional investors’ in climate finance;
- (iii) sooner or later the continued decline in the cost of solar panels will trigger substantial ‘end-user investments’ by businesses, households, public buildings in rooftop systems.

2.8.2 Workshop recommendations for the PSF’s private sector engagement

Many workshops have been held to discuss the options for GFC’s private sector engagement and many papers have been written on the subject. Annex II provides a short review of the most valuable contributions. Broadly speaking, (i) the PSF is to concentrate its support on the ‘development to growth stages’ of firms and of projects; (ii) a significant share of PSF support is expected to be channelled through investments in private seed capital-, venture capital- and equity funds starting with investments in fund-of-

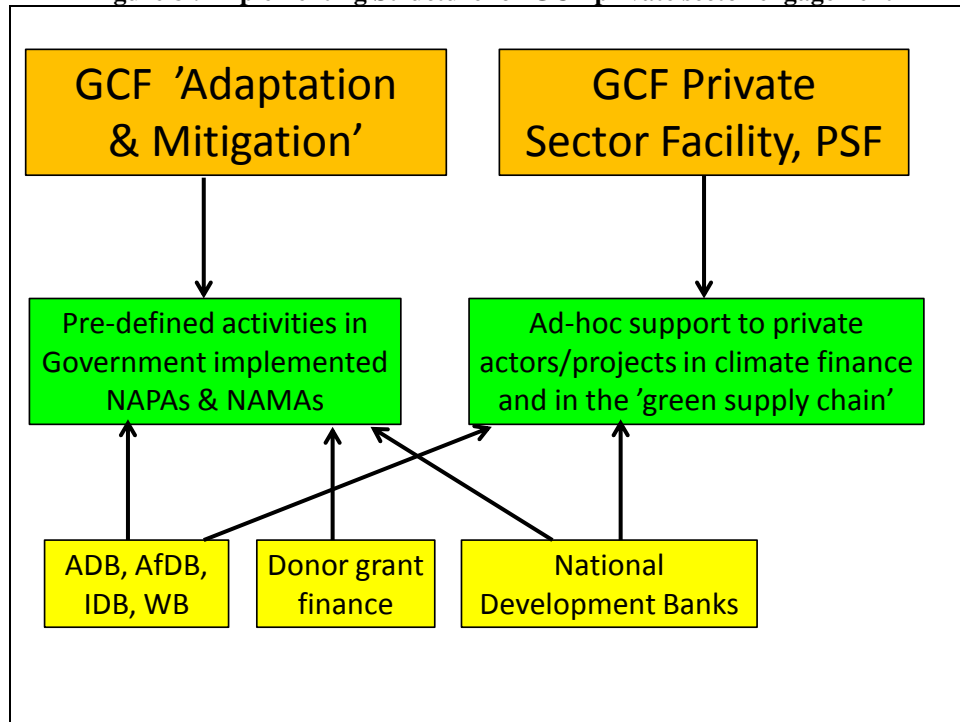
⁵⁴ Scale attracts private finance due to the volume of the business opportunity itself and due to the standardisation of finance products that accompanies a large scale demand for finance in a sub-sector. That is why large companies find no difficulties in accessing finance, and why even weak companies can find high-yield investors on the junk bond market. The financing of PV-systems in Germany was never an issue because the feed-in-tariffs for roof-top and ground based PV-systems created a mass market in the household and small business sector. All banks were eager to get a share of that market.

funds that operate at regional level; (iii) the PSF is to support the financial sector's involvement in climate finance through a number of de-risking instruments.

3 Borderline between ‘GCF-Mitigation & Adaptation’ and the PSF

The presently envisaged structure of the GCF has three facilities: ‘Adaptation’, ‘Mitigation’ and the ‘Private Sector Facility’ (PSF). Figure 8 shows a realistic division of labor between the three, ‘Mitigation’ and ‘Adaptation’ are lumped together and referred to as ‘GCF Adaptation & Mitigation’.

Figure 8 : Implementing Structure for GCF private sector engagement



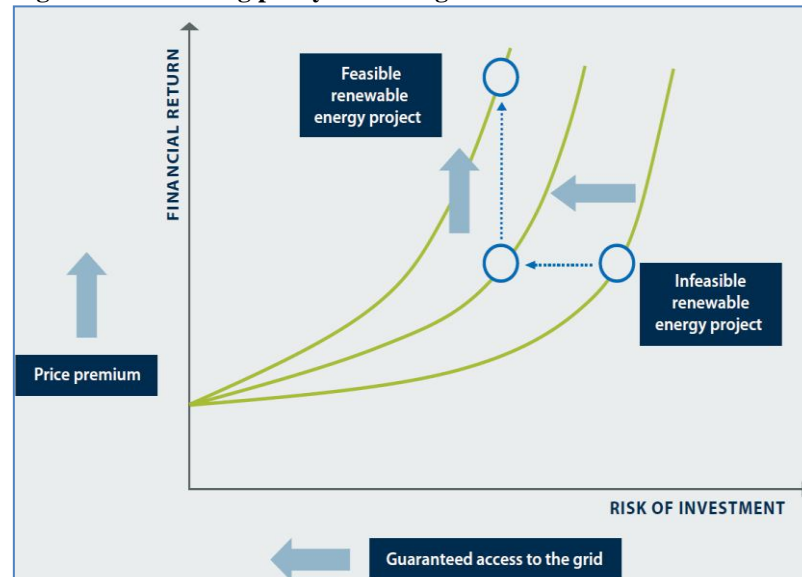
Source: Author

The bulk of GCF finance will be managed by *GCF Adaptation & Mitigation* and be used to support Government climate programs - NAMAs (Nationally Appropriate Mitigation Actions) and NAPAs (National Adaptation Programmes of Action) - as well as cross-border infrastructure investments proposed by collaborating governments. *GCF Adaptation & Mitigation* would (i) co-finance the ‘additional costs’ of investments in climate projects; (ii) support the government in de-risking the policy and regulatory framework for investors; (iii) give grant support to the capacity building of relevant public and private actors and (iv) make conventional liquidity support (refinancing and on-lending loans) available for collaborating domestic banks to finance investments included in the national program.

In the international debate, much attention has been given to the GCF as provider of ‘additional cost’ support. But whereas finance to cover the viability gap of climate projects is a *sine qua non* for investments to take place, it is the combination of policy de-risking and additional cost support which is essential for transformation to take place. The first stage in an effective policy for climate investments, is to engage in *policy derisking*: clarifying long-term government policies for climate change, streamlining the permitting

and licensing process, and providing capacity building to program administrators.⁵⁵ Figure 9 illustrates how policy de-risking interacts with ‘additional cost support’ in making climate investments commercially viable. The ‘de-risking regulatory instrument’ in figure 9 is ‘guaranteed access to the grid for RE-projects’.

Figure 9: Combining policy de-risking with additional cost finance



Source: UNDP (2013)

The *PSF* assists the implementation of Government programs by making de-risking instruments available to eligible private actors and investments and offers cost-sharing seed capital to innovative marketing and technology projects. The *PSF* supports innovative private projects in the ‘green supply chain’ (project developers and providers of climate technologies and services), and in ‘green finance’ (financial institutions offering bespoke climate finance products). The eligibility condition is that they assist the achievement of the objectives formulated in national programs, but are either not already included in these or are of a nature that makes direct *PSF* engagement with private sector entities more efficient than using a government agency as intermediary. *PSF*’s support facilities will operate at regional level, meaning that private project proposals from one country compete with private project proposals from other countries.

⁵⁵ UNDP: “Derisking renewable energy investment. A framework to support policymakers in selecting public instruments to promote renewable energy investment in developing countries”, 2013 provides an excellent analytical framework for policy makers that integrates what the report calls “policy derisking instruments”, “financial derisking instruments” and “financial incentives”.

4 ‘GCF Adaptation & Mitigation’ support to NAMAs and NAPAs

4.1 *The importance of NAMAs and NAPAs*

The preparation of NAMAs and NAPAs by the national authorities will serve to coordinate the activities of national agencies; force donors to provide their assistance to a country within a framework defined by Government and provide private investors with much needed clarity about the scale and scope of the country’s climate policy and climate investments.

The NAMAs and NAPAs will identify the package of grant support instruments, which can get maximum investment impact out of available additional cost finance. Many ‘additional cost cover’ instruments exist. The matrix in Annex IV gives a short overview of subsidy instruments in renewable energy, providing for each instrument both the source of finance: tax payer, energy consumer and external/foreign; and the target for the subsidy: cost of investment, operating costs, production revenue.

International assistance to climate projects in developing countries has been wasteful. Examples of overlapping efforts, ‘re-inventing the wheel’ or providing contradictory advice are legion. There was not much coordination neither between government agencies inside an aid recipient country, nor between donors providing aid to climate projects. Lack of coordination could take place in the absence of an integrator, such as, for example, rural electrification master plans in access projects, or SWAps in the health sector.

The NAMA/NAPA-GCF finance modality offers an incredible potential for the rationalization of the international financial support to mitigation and adaptation projects in developing countries. The institutional framework and procedures for the GCF’s interaction with national authorities are still under development. But one may assume that a single national authority will have overall responsibility for the coordination of international assistance to the national climate programs, while on the donor side a lead donor, typically WB, ADB, AfDB, IDB, will be entrusted with the responsibility for improved donor coordination.

To achieve results, the GCF needs a clear strategic focus with associated clearly defined success criteria against which the pertinent sector managers can be held accountable. For ‘GCF Adaptation & Mitigation’ the three strategic targets are (i) to assist in putting in place de-risked national policy and regulatory frameworks, (ii) assist in the rationalization of international donor support and (iii) assist in putting in place support schemes that get maximum investment impact out of limited funds for additional cost finance.

4.2 *De-risking the national policy and regulatory environment*

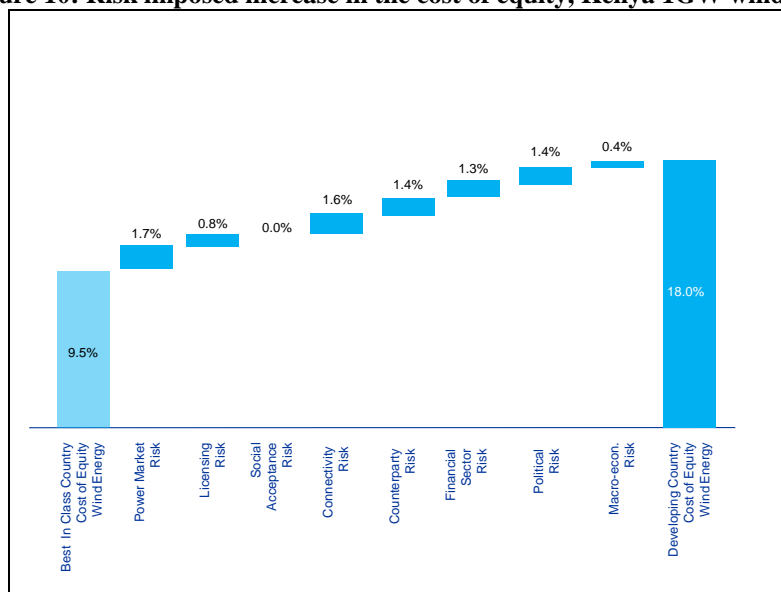
Whereas private investors can manage risk, uncertainty is an absolute deterrent to private investment. The NAMA/NAPA-GCF modality targets the adoption of a policy framework and a regulatory regime which minimizes policy & regulatory risks faced by investors, and hence the cost of capital for investments.

Regulations can introduce a demand for climate technology directly, by imposing a requirement for investments in mitigation and in adaptation upon both private and public actors in an economy. Building

codes imposing higher EE-standards are an example. The regulatory framework is also to reduce investor costs of transactions and to make the risks of climate investments assessable and calculable.⁵⁶

Inefficient frameworks, which increase the risk of investments, and hence, the cost of capital, burden the subsidy-capacity of national Governments and of donors. Figure 10 illustrates the order of magnitude. It shows the risk premiums calculated by financial modeling for a large windfarm investment in Kenya. The chart shows how the cumulative impact of the risk premiums for power market risk, counterparty risk⁵⁷, licensing risk, connection risk, political risk, macro-economic risk, financial sector risk, and social acceptance risk, increase the required rate-of-return on equity from 9.5% to 18%.⁵⁸

Figure 10: Risk imposed increase in the cost of equity, Kenya 1GW windfarm



Source: UNDP (2012)

The project risks impact not only the cost of equity, but also the *cost of debt finance*. In the example shown in figure 11, the risk penalty for windfarm *debt* in the developing country is 5%, leading to a cost of interest of 10%, double the rate for a similar investment in the developed country. The risk penalty for *equity* adds an extra 8% to the 10% rate of RoE requirement in the developed country. Assuming a capital structure for a

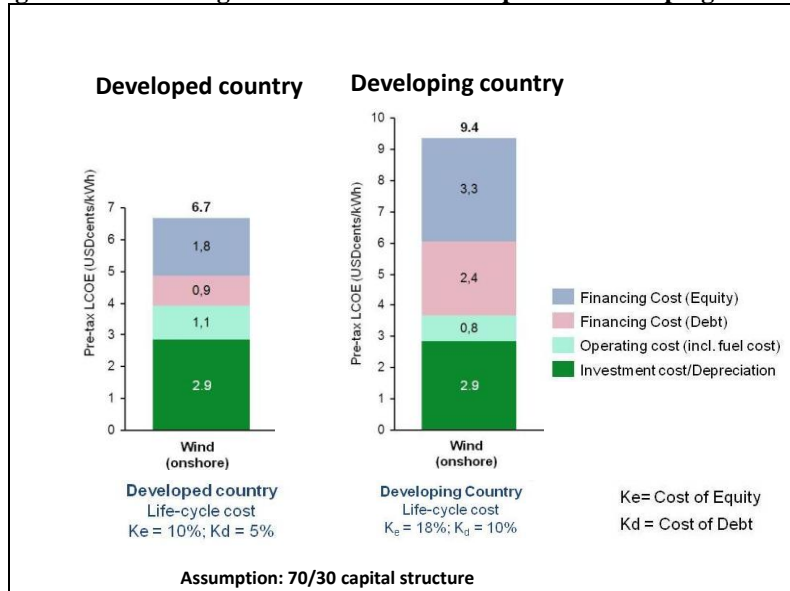
⁵⁶ To attract private sector investment to low carbon infrastructure projects the risk-return profile of these must be improved relative to business-as-usual brown infrastructure projects and other investment alternatives. An OECD report looked at two issues. (i) What types of risks are associated with investing in LC-infrastructure? (ii) Which risks impact investors most significantly? The most important risks are those that have both high probability and high severity. Based on investor responses, (i) the greatest of these is longevity risk: the relatively short time frame of climate change regulations or incentive measures compared to the long-term commitment periods required for amortising the capital investment. (ii) Risks of facing high transaction costs, including compliance with reporting and verification procedures were also considered high. The next highest risks are: (iii) human/operational risks due to lack of well-trained workforce to implement projects; and (iv) risks of fluctuations in economic conditions and commodity prices.

⁵⁷ The counterparty risk refers to the inability or unwillingness of the power utility, purchasing the power output under the purchasing power agreement (PPA) with the windfarm, to pay for delivered MWhs.

⁵⁸ Compared to domestic developer expectations in Africa, this estimate is on the low side. The Group of Seven report on climate finance provides the following Equity returns for infrastructure projects in the developed world typically range from 9-11%; an investor in a specific infrastructure project in Mexico expected 15-17%; an investor in an infrastructure project in Turkey demanded 20-25%; an investor in a biofuel project in West Africa expected 40-60% return. The report ascribes the large differences in rate of return expectations to the failure of capital markets to provide appropriately priced risk mitigation tools.

RE-power plant investment of 30% equity and 70% debt (the equity requirement may vary from 20% to 50% depending on the country and the developer), we arrive at a weighted cost of capital (before taxes) of 6.5% for the windfarm in the developed country and of 12.4% in the developing country.

Figure 11: Financing Costs for Wind: Developed vs. Developing Country



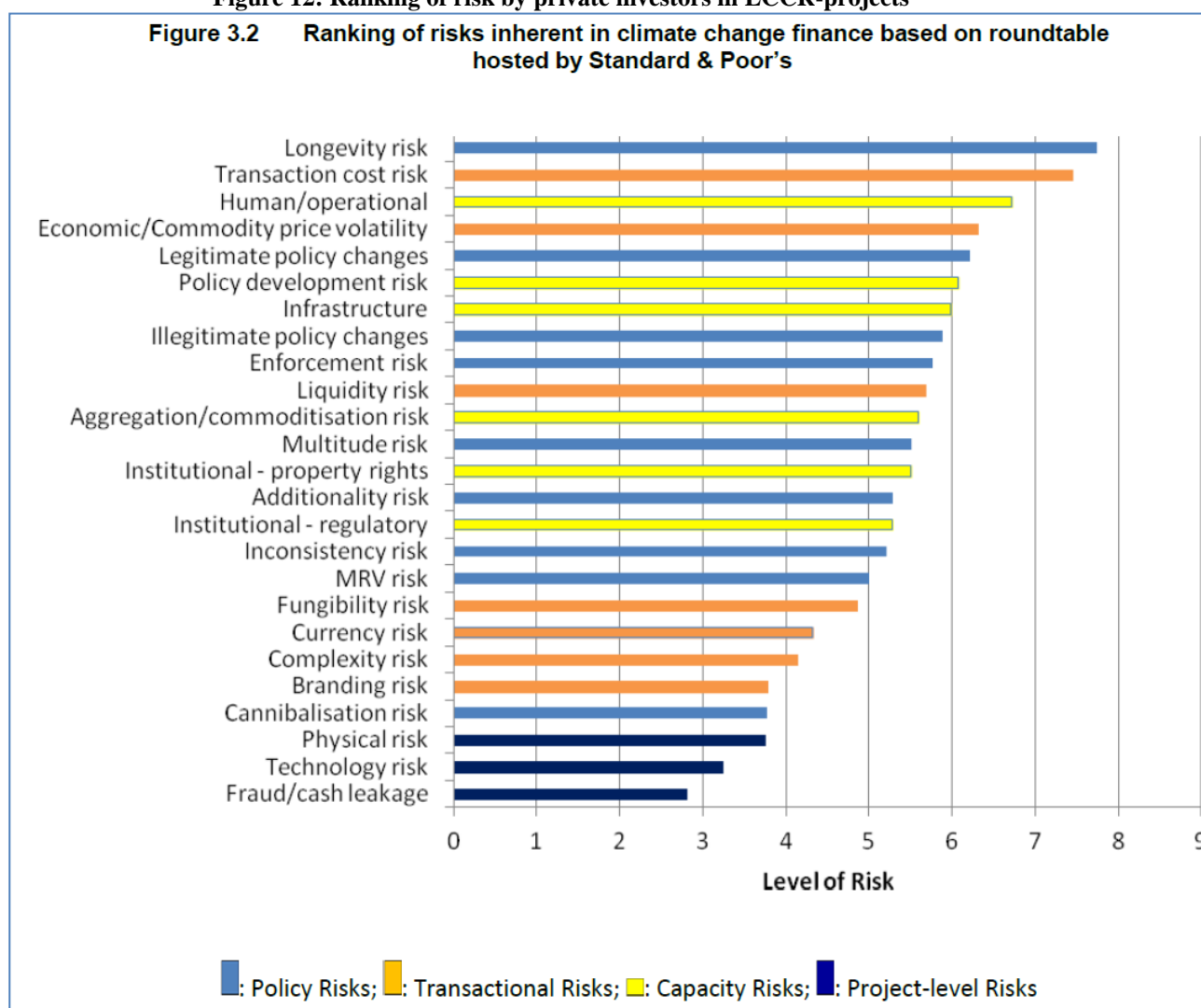
Source: Composition based on UNDP (2012)

The higher cost of capital increases the windfarm's cost of production by 40 percent from 6.7 USCents/kWh to 9.4 USCents/kWh. This represents an additional feed-in-tariff-premium of 2.7 USCents/kWh.

Thus, whatever de-risking instruments the PSF can offer to individual investors, pales in terms of impact in comparison with the de-risking a national policy and regulatory framework through well-managed GCF-NAMA-NAPA collaboration. The dominance of policy and regulatory risks over project-related risks is evident in figure 12 below, which shows the ranking of risks resulting from an investor roundtable organized by Standard & Poors.⁵⁹ The most significant risks are *policy risk*, including longevity risk (rank #1) - the relatively short time frame of climate change regulations and incentive measures, compared to the long-term commitment periods required for capital investment – risks from policy changes (#5 and #8), and risks that rules are not fully binding or difficult to enforce (#9). Next in importance are transactional risks, with Second is the risk of *incurring high transaction costs* (#2) – caused by securing project approvals and by the complexity of compliance with GHG reporting and verification procedures in the CDM market - economic/price volatility risk (#4), and liquidity risk (#10). Third in line are *capacity risks*, including risks from lack of a well-trained workforce (#3), lack of capacity to understand and develop policy (#6), poor supporting infrastructure (#7). The transaction cost risks and the capacity risks are also part of issues to be addressed by NAPAs and NAMAs. Last in line are the ones most likely to be addressed by the PSF: *project level risks* - technology risk, resources risk, natural hazards etc.

⁵⁹ Source: OECD Working Party on Climate, Investment and Development: "Mobilising Private Investment In Low-Carbon, Climate-Resilient Infrastructure", ENV/EPOC/WPCID (2012)

Figure 12: Ranking of risk by private investors in LCCR-projects



Source: OECD Working Party on Climate, Investment and Development (2012)

4.3 International coordination the integrating function of GCF

GCF as integrator of international climate flows has an important supporting role in the efforts of client Government's to improve the coordination of national and international actors in national climate finance.

4.3.1 Cooperation with development banks

The development banks will be the most important partners for the implementation of financial assistance from GCF Adaptation & Mitigation. GCF will cooperate with four categories of development banks: (i) The large international and regional development banks: World Bank, ADB, AfDB, IDB; (ii) the larger development banks from donor countries: EIB, KfW, China, Japan and (iii) the smaller regional development banks such as the CAF; (iv) national development banks (NDBs) in client countries.

The NDBs, as seen in section 2.6, differ greatly in their scale and their scope, the difference will be reflected in their role in the implementation of NAMAs and NAPAs. The large NDBs will have a key role in coordinating the financing of NAMAs and NAPAs, providing significant finance of their own. Small NDBs can be involved only in a few specific aspects of NAMA and NAPA financing.

The large MDBs will co-finance GCF-supported NAMAs and NAPAs and organize international technical assistance to these, including TA financed by GCF Adaptation & Mitigation. The MDBs have their procedures and expertise in place for the collaboration with executing governments; it will not make sense for the GCF to build up a parallel structure of its own.

4.3.2 Cross-cutting international programs

The SE4All initiative, by including goals for increased EE and an increased share of RE in global power supply, overlaps with the GCF agenda, at the planning stage in the preparation of national SE4All investment plans. Other external finance initiatives also call for national planning specifically for their modes of operation and finance eligibility: e.g. SREP, Energy Plus+ and GetFit.

4.3.3 Cooperation with funds and carbon markets

UNDP estimates that more than 50 international public funds, 45 carbon markets and 6,000 private equity funds provide climate change finance.⁶⁰ Some of the public climate funds will be made redundant by the creation of the GCF. In anticipation of the GCF, they were created by donors as pilots to test new finance models to support the transition towards low-carbon economies and to act as intermediaries for channeling donor finance to climate projects. Other funds will remain; with these, the GCF is expected to have three different interactions:

1. Co-financing of climate programs submitted by Governments to the GCF.
2. Sub-delegating to development banks, such as ADB, the responsibility for managing Board approved support programs; e.g. the development and marketing of specialized insurance and guarantee products, or TA to the introduction of a new public finance product.
3. Co-financing of new equity and mezzanine finance vehicles.

4.3.4 Cooperation with Civil Society Organisations (CSOs)

Civil Society Organisations (CSO), e.g. industry organizations, are essential collaborators in a transformation process. In principle, their involvement – and funding for their involvement - could be inscribed in national action plans. However, GCF assistance to CSOs is most efficiently undertaken through the PSF and on a sub-regional, not on a national basis. The functions of the CSOs will be similar across countries and providing support through a regional project allows the PSF and collaborating PSOs to benchmark their performance against each other. This report recommends that PSFs creates a special CSO financing window and draws upon lessons learned from GEF's collaboration with CSOs.

4.4 Formulas for the 'additional cost' and for the sharing of costs between national sources and donor finance

4.4.1 Achievement of 'external grant efficiency'

An important strategic challenge for the GCF Board concerns *the achievement of 'external grant efficiency'*: that external grant- finance covers only costs that are truly additional within the context of the national economy. This requires decisions on:

- (i) the formula for establishing/calculating the 'additional costs' of a climate program;

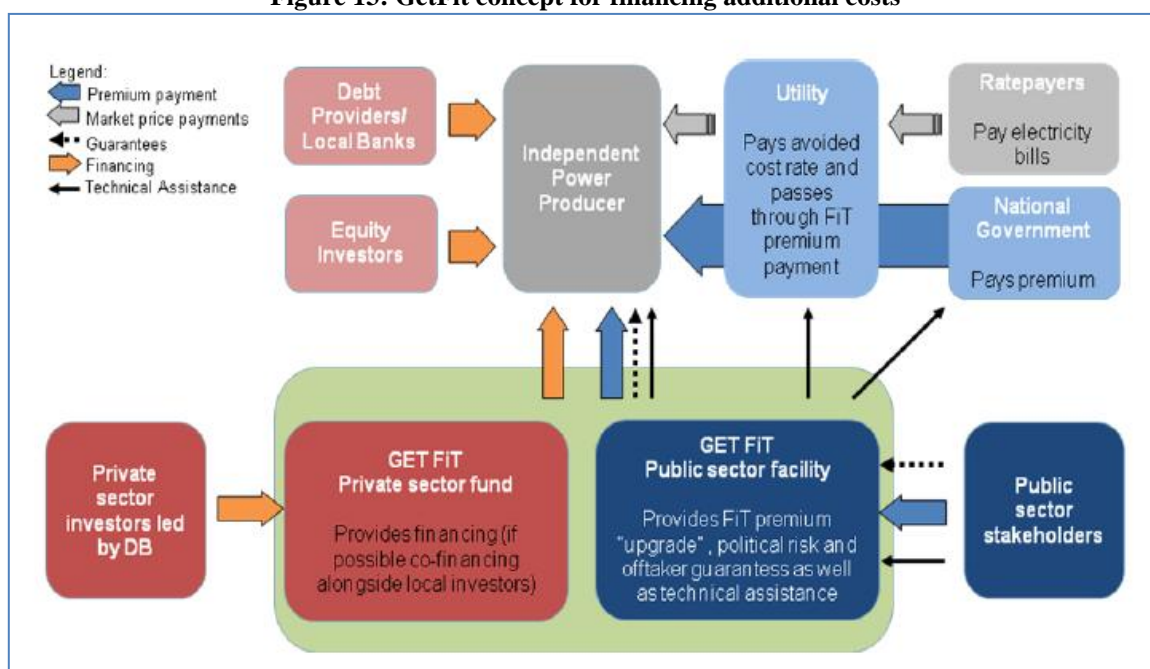
⁶⁰ Regional Dialogue on Climate Change Finance, Joburg April 2012

- (ii) the formula for the appropriate cost-sharing of ‘additional costs’ between the recipient economy and external donors/GCF;
- (iii) the payment mechanism for channelling additional cost finance from the GCF to recipient Governments and to projects.

4.4.2 The GET-FIT formula

The GET-FIT Program, a joint German Government – Deutsche Bank initiative, has developed an interesting formula for an efficient sharing of the additional costs of RE between the host country and external donors. The premise is that clean energy provides a number of energy policy benefits for the host country: security of supply, reduction in imported fuel dependence, local environmental improvement, price stability, employment creation and development of new manufacturing and service industries. The value of these ‘external economic benefits’ for the national economy offsets some of the additional financial costs of clean energy compared to the financial costs of conventional power supply. From this results a formula for how the additional financial cost - the per kWh clean energy premium - is to be shared between a national Government and the donor community: the donors grant finance the difference between the premium per kWh and the estimated economic value per kWh of the local benefits from clean energy.

Figure 13: GetFit concept for financing additional costs

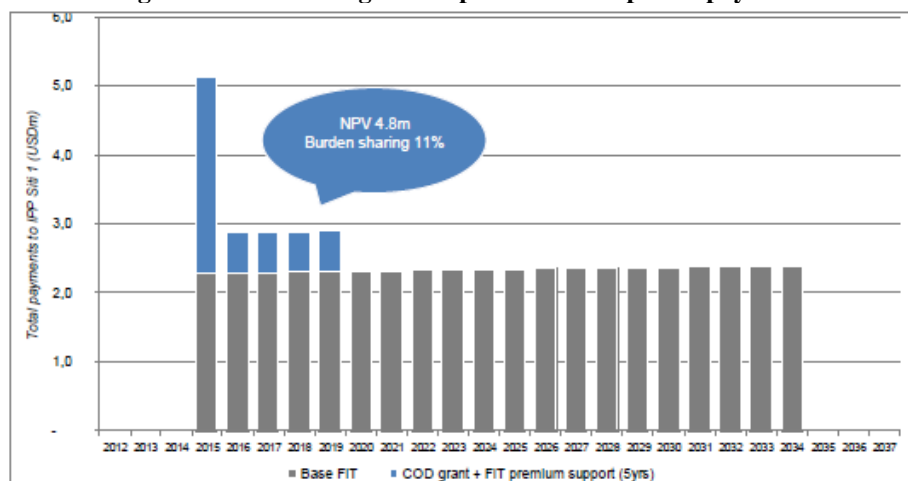


Source: DB Mark Fulton: “Choosing Appropriate Incentives to Deploy Renewable Energy”, 2012

The cost-sharing modality can be implemented in various ways. Figure 13 shows one possibility, the GetFit concept developed by Deutsche Bank and KfW. The chosen instrument is a FiT-premium paid on top of the power market rate, which the off-taking utility pays to the RE-generator for power supply. Part of the premium is paid by the national state budget, the other part, the GET-FIT payment, by a donor financed fund. The GetFit concept operates with two funds: a public sector facility to pay for the externally financed part of the feed-in-premium and a private financed fund which will compete with our sources of finance, including local private finance institutions (PFIs), for providing required project finance to developers.

The donor financed part of the premium does not have to be paid during the 15-20 years lifetime of a PPA with a feed-in-premium. The NPV of the donor financed fee-in-payments can be paid upfront upon commissioning or partly upon commission and partly during a few initial years, as indicated in figure 14.

Figure 14: Structuring GetFit premiums as upfront payments



Source: KfW: “GET FiT East Africa Program –Uganda Roll-Out Phase 1”, 2012

4.4.3 Mechanism for additional cost payments: ‘payment by result’

The Board may discuss the *most appropriate mechanism for additional cost payments*. The nature of NAPAs and NAMAs makes them suitable for the application of ‘payment by result’ concepts. Government programs supported by GCF Adaptation & Mitigation will receive ‘result based aid’.⁶¹ The Government can in its programs use ‘result based finance’ for in-country delivery of additional cost support to projects.⁶²

4.5 ‘GCF Adaptation & Mitigation’ support to bank lending

4.5.1 On-lending and re-financing facilities for banks

Developers in ADB client countries face loan tenors of typically 5 to 7 years, in a few countries up to 10 years. The possibility for longer loan tenor is restricted by financial sector regulations that force banks to maintain a term balance between the maturity of their (short term) funding and the maturity of their (long-term) lending. The conventional instrument in this case is to provide *long-term loans or re-financing facilities* to banks participating in climate finance, thereby directly providing the required match between the tenor of funding and the required longer-term tenor for green loans. The NAPAs and NAMAs will, therefore, include on-lending and refinancing facilities for long-term loans by national banks to eligible

⁶¹ ‘Result based aid’ is a ‘Government to Government’ (or donor to Government) payment mechanism, under which the donor transfers committed resources upon delivery of verified results. The objective for the donor is to get maximum desired results/outcomes per invested grant unit, and being able to document it. REED+ and Energy+ are promising ‘result based aid’ concepts.

⁶² ‘Result based finance’ is a ‘public to private’ finance modality, where the Government pays private operators an output based premium for providing results that are in the public interest. An example is the Forest Carbon Partnership Facility (FCPF), an emission reductions program targeting the drivers of deforestation and forest degradation. It helps reduce the rate of deforestation and forest degradation by providing an incentive per ton of carbon dioxide of emissions reduced.

projects identified in the plans. Due to the MDBs' strong expertise in assisting national development banks and commercial banks with on-lending and refinancing facilities and with capacity building TA for climate loans, they will be the logical intermediators for channeling GCF Adaptation & Mitigation on-lending finance to national finance institutions.

4.5.2 Syndicated loan finance with local bank participation

The NAMAs and NAPAs will include the financing of large complex projects by bank syndicates with participation from MDBs and local banks. The participation of MDB co-finance in an investment area, which is new for local banks, allows these to piggy-back on the technical expertise of the development bank and get first-hand exposure to the due diligence issues in the sector through their interaction with MDB experts.

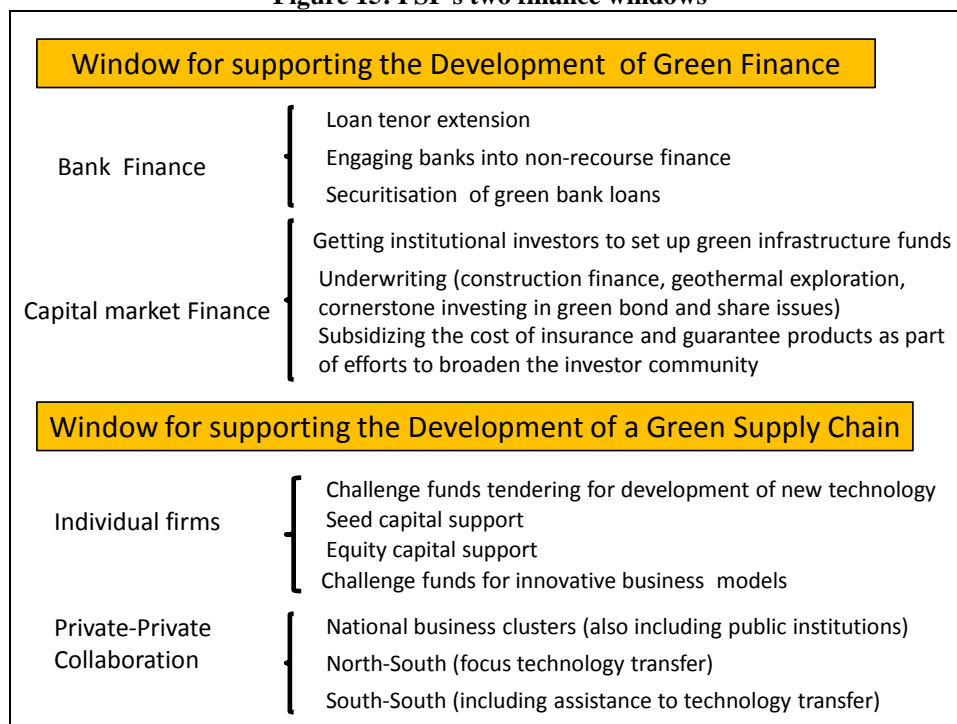
In countries where lack of long-term finance prevents local commercial banks from participating in the financing of large-scale and complex projects, GCF Adaptation & Mitigation can channel long-term debt finance to these, through one of the MDBs that participate in the syndicated loan.

5 Organisation of PSF's engagement with the private sector

5.1 Windows for 'green finance sector' and for 'green supply chain'

This report recommends that PSF's private sector engagement targets two transformation objectives: 'greening the finance sector in developing countries' and 'strengthening the green supply chain in developing countries' - enterprises involved in the planning, development, construction and operation of mitigation and adaptation infrastructure. If that focus is accepted by the GCF Board, the allocation of funds to the PSF could in the beginning use the following formula: budget lines for 'green finance sector' 35%, for 'green supply chain' 35%, reserve: 30%

Figure 15: PSF's two finance windows



Source: Authors

In an ideal *green finance system*, long-term finance is supplied by entities with committed long-term horizons; and a broad spectrum of financial instruments is available to support long-term investment. The developing countries are far from this goal. This report recommends that the objective of the PSF's work in green finance is to bring the finance sector closer to the ideal situation. In doing so, the PSF is to work on three fronts.

- (i) Since banks provide 75 percent of all finance in developing countries, it is essential that the ability of banks to offer finance products covering the needs of climate investors is improved.
- (ii) Climate investments must be given increased access to capital market finance by developing a market for green finance bonds. This broadens the finance options for investors and, as a side-effect, increases the willingness of banks to engage in green finance, as it provides them a means to exit loans through securitisation.
- (iii) Institutional investors from developing countries must be engaged in green infrastructure finance.

This report recommends that GCF sets up an *Innovation Fund* to be responsible for managing PSF's *green supply chain* assistance. Due to the diversified nature of those entities, the Fund would be a fund-of-funds financing a number of specialized sub-funds supporting small project developers and business innovation with seed capital and green incubation centers. At a very ambitious level the PSF may also provide incentives to foster private-private collaboration and public-private collaboration likely to have a transformational impact. The Innovation Fund would be managed by PSF staff; some of the specialized sub-funds would be managed by PSF staff, others by private managers selected by tender.

5.2 Providing private investors with direct access to the PSF – in what form?

5.2.1 Setting up funds operating according to commercial principles

The PSF is likely to implement its direct private sector engagement through investments in funds as they provide the hands-off decision taking and flexibility needed to react nimbly to the private world of deal making and investing. Funds can employ multiple instruments, for example offering credit enhancement products, lending at longer tenors or providing equity for otherwise un-bankable projects.

A number of experts expect PSF to co-invest in the creation of venture capital, private equity and infrastructure funds. Private-equity and venture-capital funds are said to be “uniquely suited to financing climate-related investments because they tend to back innovative projects, support early-stage companies, and help such companies improve their business and technical capacity. These funds are expected to provide only a small part of the estimated \$4.6 trillion in climate investment needed worldwide, but they can fill a key niche in emerging markets”.⁶³ However, if these funds operate on commercial terms, they compete with private funds, meaning that they crowd-out private investments for the sector rather than crowding them in. Use of public finance to set up commercial funds requires, therefore, careful justification. For example, to serve under-served niches in the market for capital and/or to create competition to drive down inflated fund management costs.

In view of the un-invested USD100 billion lying around in private equity funds in Asia, the hypothesis of a need for gap-filling funds for investment in climate projects seems farfetched. A niche, targeted by small private equity funds set up with IFC and ADB assistance, is small-scale projects in countries at the start of a climate policy. In such cases, projects are small (meaning the transaction costs to develop them are high per invested unit), the market development perspectives in the medium term are modest and the timing of a larger market in the longer term is uncertain. Such funds serve a pioneering function, but they do not call for large scale investments by the GCF. Once a market grows, professional project developers with the ability to bring projects through the project approval and construction phases, eliminate the need for them.

Despite the plentitude of private equity funds, there is no price competition in the market: the ‘2%+20%’ fee formula is the standard used by ‘all’, including by managers of underperforming funds. They survive in the market because it is difficult a priori to identify underperforming managers on a forward looking basis. However, high management fees deter the creation of funds which focus on investments in climate projects because the moderate profit margins of many climate projects do not bring sufficient returns to fund investors once the management fees have taken their share. Thus, if it is feasible to set up funds with lower

⁶³ Source: IFC Catalyst Fund Mobilizes \$280 Million to Spur Climate Investment by Private Equity Funds. IFC.org

costs of fund management, e.g. making use of the supply of financial expertise coming from the downsizing of staff in large investment banks, then fund investments by the PSF are an effective response to market failure. Lower costs will then allow PSF-supported private equity funds to move earlier and deeper into climate investments.

Yet, to fulfill its market expanding purpose, the concept requires that the compensation of fund staff is structured to incentivize these to target investments in ‘difficult projects’; rather than in ‘very commercial projects’, where they outcompete conventional funds. If they invest mainly in the latter, the beneficiary project developers may benefit from better terms than those offered by competing private equity and infrastructure funds. But, private finance is crowded out!

5.2.2 Directly investing in private equity funds

ADB has made an equity investment of \$20 million in the *Clean Resources Asia Growth Fund (CRAGF)*, targeting private equity investments in promising clean energy technology companies. The private equity fund, sponsored by CLSA Capital Partners, a brokerage and investment group active in Asia since 1986, targets businesses engaged in clean energy-related operations in Asia, with the main focus on China and India. It will make about 12 to 14 investments, taking significant minority positions in investee companies. The targeted fund size is \$200 million.

In view of the rapid expansion of private equity funds, particularly in Asia, by the time the PSF becomes operational, this will be a yesterday’s instrument. The willingness of private equity capital to move into climate finance increases in line with the expansion of the annual climate investments and the associated reduction in policy and regulatory risk.

5.2.3 Waterfall structures: ‘first loss facility’ and ‘capped return’

Public-private-partnership funds are set up with the intended purpose of ‘crowding-in’ private investors; with institutional investors being the main target group. The funds include one or more international development finance institutions (IDFIs) – IFC, ADB, KfW, etc. – as cofounding investors in the fund; the fund manager undertaking the vetting of investment objects is from a commercial investment bank. In theory, such funds are an excellent instrument for allowing first time institutional investors to become acquainted with climate finance in developing countries. The IDFIs, with their networks on the ground in developing countries and knowledge of the public sector players, provide comfort to institutional investors who are unacquainted with the market. In addition to the IDFI-comfort effect, two other strategies are applied to attract co-investments from institutional investors.

- Some funds copy the business concept of private infrastructure funds, offering investors into the fund the possibility to co-invest directly into projects which the fund invests into. This satisfies the preference of institutional investors for direct investments into infrastructure projects. For institutional investors, investment into a fund in this way is not an end in itself, but an entry ticket for direct investment.
- The other is to set up a ‘structured fund’ to increase the risk-adjusted rate-of-return for private co-investors. Some structured funds do this by reducing private sector risk through a first loss equity facility, where public investors take a first loss position in the fund. Others provide a private return kicker through a capped return arrangement, in which the rate-of-return on the capital investment of public investors is capped, letting all fund returns above that rate accrue to the private co-investors. In a typical three-tiered ‘waterfall’ structure: bilateral donors invest

equity in a first loss capital tranche of the fund; development banks invest in the mezzanine tranche⁶⁴; private investors in the senior tranche of the fund.

The capital to achieve first close is provided by the public investors (donors and development banks) with a commercial finance institution joining as Fund Manager providing a minor equity share. The funds are created with the expectation that other private investors will join once the fund has become operational, so that the targeted capital for final close can be reached within the next 1-2 years.

The logic of the structured funds is compelling. For private finance institutions, the risk adjusted rate-of-return on finance to climate investments is, in the present market situation, too low to compete with alternative investment options. The layered structure, with public finance accepting zero or low rates of return for their junior tranches, adjusts for the problem that the fund's return on investments (RoI) is below the rate required to attract private capital into the fund. It lifts the rates of return on the senior tranches of the fund above the level of the fund's RoI and, if it works, to a level, which can attract private co-investment.

Yet, often, the funds often not succeed in attracting private capital on top of the Lead Investor's capital for the first close. This was the experience of the Deutsche Bank's European Energy Efficiency Fund (EEEF), of the EU's GEEREF and of the Global Climate Partnership Fund (GCPF), discussed in the text box below. The design of the fund represents best practice; it is difficult to pinpoint aspects that can be improved.

- It has flexibility in use of instruments.
- It includes donors, development banks and commercial banks in its financial structure, which helps shape mutual understanding of market realities.
- It will have a long-term lifetime, unlike equity funds that typically operate 8 years from financial close to final unwinding. Climate finance (and institutional investors) need long-term involvement.
- It has a very experienced fund manager.
- Starting off with a large capital base purely composed of equity enables the GCPF later to raise debt from the international capital market through note issues.

Yet, it took GCPF three years from its creation until it was able to close its first deal. And despite its waterfall structure, by April 2013 the fund has managed to attract only USD 30 million in finance from institutional investors.⁶⁵ The primary business area chosen for the fund, providing refinance to local banks of loans for climate projects, fulfills the ambition of filling a niche not served by commercial investors. But because the difficult price-competitive situation of climate technologies does not give room for the charging of high interest rates on loans to climate projects, the commercial terms of the GCPF create little demand from local finance institutions.

⁶⁴ Mezzanine finance is a hybrid form of finance with equity and debt characteristics. Like equity financing, mezzanine financing is an unsecured debt. Unlike a bank loan, mezzanine financing does not hold real assets of a company as collateral; instead, lenders offering mezzanine financing have the right to convert their stake to an equity or ownership in the event of a default on the loan. Like debt financing, mezzanine financing charges interest; but offers more flexible payment schedules than conventional loans.

⁶⁵ The investor, ÄVWL the pension fund for doctors in the German province of Westphalia-Lippe, does invest in energy also directly: in 2012 it joined forces with some energy supply companies to buy the grid operator Amprion.

Global Climate Partnership Fund (GCPF)

Legal status: SICAV-SIF vehicle in Luxembourg

Investors: The Fund was founded in 2010 as an initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and KfW. The IFC and the Danish Government have since also invested in the GCPF.

Fund manager: The GCPF is organised under private law. The fund manager is Deutsche Bank.

Fund size: First close of US\$ 205 million. The target is a final close of US\$ 500 million by 2015 with the additional capital coming from commercial finance institutions. In 2013, the German pension fund Ärzteversorgung Westfalen-Lippe invested USD 30 million.

Waterfall structure The GCPF offers three different tranches of shares and notes to its investors, each with a different risk and return profile:

- *C-Shares* offer a “First Loss” buffer for the more senior share categories of B-Shares and A-Shares. Issued notes rank senior to shareholders, but junior to all other creditors of the Fund.
- *B-Shares* and A-Shares get a remuneration calculated on a Libor + Spread basis; complimentary dividends are possible, depending on the Fund's profitability.
- Because *A-Shares* rank senior to B-Shares, they are remunerated at a lower level than B-shares.

Note issues: The Fund may issue notes to private investors which rank senior to all shareholders

Finance products:

- The fund provides *financing resources* on commercial terms to financial institutions in developing and emerging countries for innovative lines of credit for climate projects by SMEs, households and municipalities, as well as *co-financing of projects*. Instruments include senior debt, subordinated debt and guarantees. Maximum investment size per financial institution is US\$ 20m; minimum is US\$ 5 million; investments can have a maturity of up to 15 years.
- The Fund also *co-invests directly in EE and RE projects* and provides debt or equity during all phases of a project. Co-investments are available mainly for institutions with little or no experience, seeking a strong partner in the field of energy financing.

TA facility A TA facility assists institutions with limited experience in sustainable energy lending to design, set up and implement the new business.

Investment process: Deutsche Bank, as investment manager, is first contact point, determines whether the project meets GCPF's investment criteria and initiates a due diligence process. Subject to approval of the investment proposal by the Funds' investment committee, Deutsche Bank then process with financial closing.

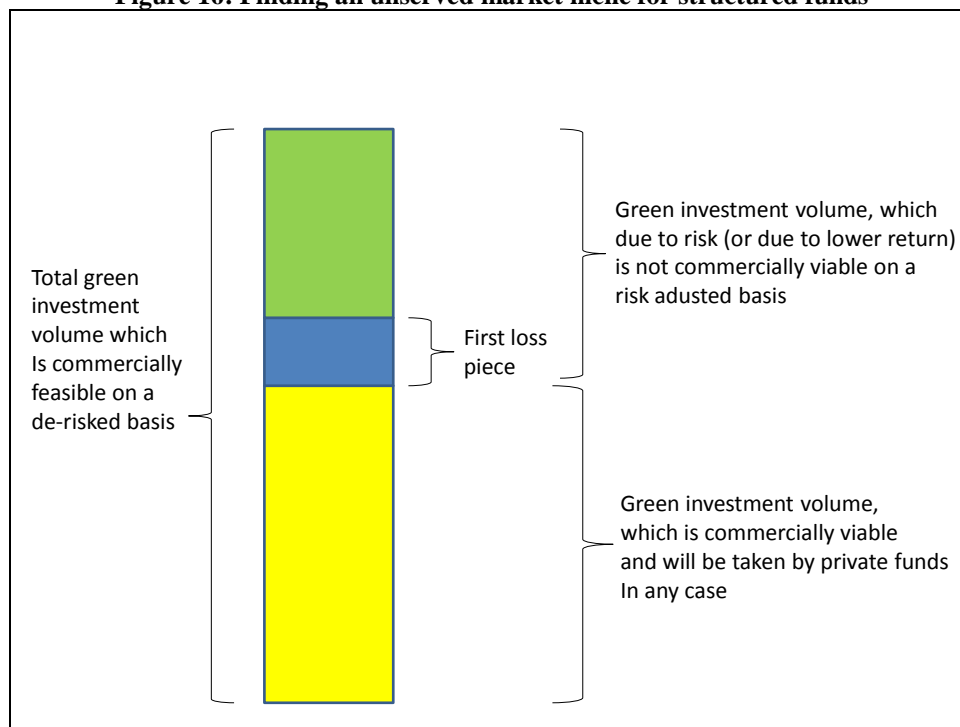
Investment record: It has taken the GCPF two-and-half years to get from the start-up phase to the conclusion of its first deal. By March 2013, US\$ 153 million of the pledged capital has been invested in projects in financial institutions in Brazil, Ecuador, Mongolia, Turkey, Ukraine, Vietnam and in a 1 MW solar PV plant in South Africa.

Private fund raising record Beyond Deutsche Bank, the fund manager, ÄVWL the pension fund for doctors in the German province of Westphalia-Lippe, invested US\$30m in April 2013.

Source: Various

Thus, although the public-private-fund for climate projects is an interesting concept, it faces difficulties in finding a right niche in practice, where it is commercially viable, yet does not crowd out private investors. Figure 16 pinpoints the dilemma.

Figure 16: Finding an unserved market niche for structured funds



Source: Author

Some climate investments – the *yellow investment volume* – are commercially viable and bankable. They will be financed by the private sector without need for public finance enhancement. Other climate investments – the *blue and green investment volume* - are financially viable only before their risks premiums are added to their cost of capital. Their risks – novelty risks, policy risk, counterparty risks, etc. - result in risk premiums that move the projects outside the realm of bankability. The ‘risky market’ can be developed by a structured fund, where a donor-financed first loss tranche takes on the excess risk. However, if management focuses exclusively on the risk market, then the risk-adjusted returns for commercial investors into the fund are neither higher nor lower than returns on funds investing in the commercial market. The difficult part is how to incentivize fund management to develop the risk market instead of investing in the commercial market where risks are lower and therefore, would yield a higher return to the fund? It can be done by singling out a specific geographic or technology focus for the fund.

5.2.4 Fund of funds

A concept which won favor in parts of the development community, is to structure a public-private partnership fund as a “*fund of funds*”, also referred to as ‘*cornerstone fund*’. These funds invests in commercial funds, which in turn finance climate projects and companies.⁶⁶

Proponents of the ‘fund of funds’ approach make the claim, that it has a higher leveraging impact than the ‘fund’ approach. The argument is that a fund of funds can attract private capital already into the cornerstone fund itself. An example is the IFC Catalyst Fund, in which, early 2013, IFC, the governments of Canada and the United Kingdom, and the sovereign wealth fund of Azerbaijan invested \$280 million. They expect that private investors will add to the capital. However, the double leveraging effect of the ‘fund of funds’ approach is a mirage. Donors and development banks invest in setting up a fund-of-funds’, yet, despite

⁶⁶ Also some private equity fund have ‘funds-of-funds’ in their portfolio.

marketing efforts of the initiators, neither commercial banks nor institutional investors join as limited partners. The increase in overall fund management costs, by having two layers of investment fees before money reaches a low-carbon investment, deters commercial investors. However, the ‘fund-of-fund’ structure is convenient for donors who want to support private investors, yet do not have the in-house expertise to reach such investors themselves. They outsource the function to a ‘fund-of-fund’ manager.

To conclude deals, takes time. It took the Global Energy Efficiency and Renewable Energy Fund (GEEREF) four years from the start of its creation to close its first deal, see the text box below.

Global Energy Efficiency and Renewable Energy Fund (GEEREF)

Fund of funds targeting investments in RE and EE infrastructure funds and similar structures in the African, Caribbean and Pacific region, non-EU Eastern Europe, Latin America and Asia.

Fund size: €108 million originally intended to be invested over a period spanning from 2009 to 2012.

Investors: European Union, Germany and Norway from start of set up in 2008.

Fund advisors: The European Investment Bank Group: the European Investment Bank and the European Investment Fund

Investment policy: GEEREF typically invest below €10 million, a market niche usually ignored by private investors and international finance institutions.

Instrument for pipeline/deal development: GEEREF provides seed capital grant of €0.1-1 million to the creation by private initiative of private equity funds specializing in climate finance. The grant covers a part of the cost of the legal, tax, strategic and administrative setup. After fund establishment, the GEEREF has the option to co-invest in the fund.

Results Late 2012, GEEREF has achieved 5 Funds closings: REAF (India and South Asia), Evolution One (South Africa and Southern Africa), DI Frontier (Kenya, Tanzania, Uganda and East Africa), CTLAF II (Mexico, Brazil, Peru and Latin America), Armstrong S.E. Asia (Indonesia, Thailand and Malaysia and Southeast Asia).

GEEREF’s equity participation ranges from 40% to 85% with an average of 45%.

Source: Various

It is difficult for the GEEREF to find adequate private equity funds to invest in. Due to the early stage of low-carbon investments very few private fund managers have the expertise in setting up and successfully managing funds specializing in climate investments in developing countries. Private investors trying to set up private equity funds at this development stage tend to be non-mainstream and have limited financial resources. To build a deal pipeline for fund investments, GEEREF supported the fund establishing efforts of such investors with seed-finance in the form of grants:

- GEEREF gave a grant of US\$ 100.000 to *IndiaCo Energy Efficiency Fund (IEEF)*, one of the first dedicated EE private equity funds established on the Indian market. The grant covers a part of the cost of the legal, tax, strategic and administrative setup of IEEF. IEEF provides growth capital to EE related companies in India, mostly ESCOs. Once the IEEF is established, the GEEREF has the option to expand its engagement in the fund by becoming a co-investing partner in IEEF.
- A grant of € 1.000.000 to E+Co had a similar objective. E+Co provides financing and advisory services to clean energy enterprises providing access to reliable and affordable clean energy for local communities in Africa, Asia and Latin America. The grant to E+Co co-finances the costs of establishing two clean energy investment facilities, which could later on be considered for investment by GEEREF; (i) a grant to the Africa Facility to invest in clean energy enterprises in Sub-Saharan Africa; and (ii) a grant to the Southeast Asia Clean Energy Facility which will focus primarily on investments in biomass and biogas projects in Southeast Asia.

5.2.5 Incentivising existing equity funds to invest in the carbon sector

In view of the long time it takes for publicly initiated funds to conclude their first deal, and the huge volumes of finance lying idle in Asian private equity funds, the question must be raised whether better results can be achieved by incentivizing existing funds to include investments in the climate sector within their portfolio?

The SCAF approach, summarized in the text box below, can serve as inspiration for how an incentive approach could be structured and implemented. SCAF provides economic incentive in terms of cost-sharing grants to private equity capital funds and venture capital funds to pull these into the SEED capital phase. The hope is that positive experience will convince them that SEED capital investments are a means for them to build portfolios of new projects to invest in.

Seed Capital Assistance Facility (SCAF)

Facility Administrators: SCAF is a GEF-funded initiative of UNEP, ADB and AfDB, EIB cooperates.

SCAF budget: US\$ 15 million

Objective: To mobilising private investment for early stage project developments and ventures.

The strategic concept To use economic incentive in the form of cost-sharing grants to pull private equity capital funds and venture capital funds into the SEED capital phase (which they normally would not touch) as a means to build portfolios of new projects for them to invest in.

Support lines for collaborating funds:

SL1 for *Enterprise Development Support* shares some of the elevated (and mostly non-project specific) costs associated with deal sourcing, providing enterprise development services, including training of project developers, and transacting seed scale investments. SL1 support is disbursed on the basis of a 2-3 year work plan, the time it normally takes to graduate seed financed developments into full-scale investments. The support comes in the form of an annual payment, contingent on the undertaking by the Cooperating Fund of a minimum number of seed investments, failing which part (up to 50%) of the SL1 funds received must be reimbursed. Each cooperating fund manager decides the services to offer. But common elements include: (i) identification and training of new 'pre-commercial' clean energy entrepreneurs and project developers; (ii) targeted coaching or incubator services for specific promising investment opportunities and (iii) co-financing of pre-investment feasibility studies.

SL2 for *Seed Capital Support* covers 20% of the elevated project development costs that normally are financed by the developer: technical assessments; contract negotiations for fuel-supply or off-take agreements; environmental impact analysis; and other aspects of the permitting process. Support is paid on a project by project basis subject to a quick screening by SCAF management.

Early stage investment window for establishing funds: this component assists fund managers in establishing new clean energy funds.

Results (i) Fund Managers used the offer of a SCAF Cooperating Fund Agreement to help convince their limited partner investors of raising capital and commit to the shift towards including earlier stage project engagement. Since June 2010, six clean energy funds have signed Cooperating Fund Agreements with SCAF, five are 'infrastructure-type' funds investing in RE projects, one is venture capital fund investing in clean technology enterprises in India and China. (ii) *Leveraged fund investments:* Each PPP arrangement involves ~\$1 million of project development grant from SCAF disbursed against \$5 million of seed financing from the fund. (iii) Early 2013, 4 seed investments have been made in EE & RE projects, in addition 2 are pending disbursement. No investment has been made yet in technology companies.

Source: Various

5.2.6 Are there enough deals for the public-private-partnership funds?

Setting up public-private funds to get maximum private sector engagement is en vogue. The last years have witnessed a proliferation of low-carbon funds. Some are *national*, e.g. the UK's 'Green Investment Bank', Kenya's 'Green Energy Fund' and Australia's 'Clean Energy Finance Corporation'.

Others are *international*, including some created specifically to assist the pledged US\$100 billion per year transfer of funds from Annex I-countries to developing countries.

However, some analysts are concerned whether enough deals can be made. In Asia, as mentioned in section 2.4.1, around US\$100 billion are presently invested in equity funds that are not yet committed to project investment. According to researchers at Africa Assets, there are already 19 equity funds for enterprise investments (in general, not just 'green firms') – with a focus on East Africa alone. A further 40 broader-based funds include also investments in the East African region. Since many family-owned businesses tend not to trust outside investors, there may already have been allocated too much money for national investors in the region, depressing asset prices for all. If over-investment is taking place, then public interventions in the market will crowd out, not crowd in, private capital.

5.2.7 Innovation Funds

Whereas private equity funds and infrastructure funds invest in revenue yielding assets, innovation funds share the cost of innovative development projects with private investors. PSF investments in innovation funds run a lower risk of crowding out private capital than investments in private equity and infrastructure funds.

This report recommends that GCF sets up an *Innovation Fund* to be responsible for managing PSF's *green supply chain* assistance. Due to the diversified nature of those entities, the Fund would be a fund-of-funds financing a number of specialized sub-funds supporting small project developers and business innovations with seed capital and green incubation centres. At a very ambitious level the PSF may also provide incentives to foster private-private collaboration and public-private collaboration likely to have a transformational impact.

The Innovation Fund would be managed by PSF staff. The management of innovation funds is typically outsourced to firms found by tender; but the management cost of innovation funds, in the range of 15-20 percent of invested fund capital, has raised some eyebrows in donor circles. Donors have two reasons for outsourcing the management of innovation funds. One is lack of donor staff expertise in innovation funds and in closely supervising the performance of innovation fund managers. The other is lack of region-wide presence; innovation funds are most effectively organized at regional level. The PSF will in the Innovation Fund have superb expertise in fund management and through the PSF-Representation Office have world-wide local presence in developing countries. This report, therefore, expects most sub-funds to be managed by PSF-staff; yet the option of outsourcing the management of some funds to private managers selected by tender is on the table.

5.3 Underwriting

5.3.1 Definition of underwriting

Underwriting in the conventional use of the word refers to the arrangement under which an investment bank agrees to buy a certain agreed amount of securities of a new issue on a given date and at a given price, thereby assuring the issuer the full proceeds of the financing.

In this report, underwriting by PSF refers more broadly to financial backstopping/ gap filling. This report expects backstopping support to be given: (i) to high priority infrastructure projects and (ii) to the launch of innovative green bond and green share issues in developing countries.

5.3.2 PSF finance vehicle specialising in construction finance

Problems, preventing financial closure for construction to be reached or seriously postponed, can arise from the hesitation of banks to provide loans to construction finance when relatively immature technology is used or, on the project developer/utility investor side, from limited ability to expand the balance sheet.

To provide finance in such cases, the PSF can invest in one or two finance vehicles that specialize in construction stage finance, and exit shortly after the commissioning of a project - or before, as soon as the particular circumstances, which blocked financial closure, have been lifted. The objective of the facility would be to serve as a back-stopping and gap-filling provider of finance to private projects, which are commercially viable and of high priority for Government policy.

The facility would offer *sub-ordinated debt* to encourage banks to take construction risk and *construction equity* if that is needed for financial closure.

In addition, the facility could offer capital on a contingent basis, *callable subordinated debt*, which is injected when construction costs overrun substantially. This frees up capital set aside by other parties to be used in other projects. This may be an instrument for getting local banks to move away from exclusive use of balance-sheet finance and into non-recourse finance.

The PSF would upon request by a Government look into the commercial viability of GCF participation in the underwriting of the project finance for a high priority infrastructure project. Since the PSF-facility invests on commercial terms it will not invest in white elephants. Public underwriting of project finance to ensure that high priority infrastructure projects reach financial close is an unusual instrument, since participants in tenders are supposed to be able to secure financial close. . Yet, as seen from the case of the desalination plant at Wonthaggi, see the text box below, it can be a wise strategic decision. The underwriting of the project by the Victorian Government enabled the most favorable project for tax payers / consumers to be implemented without delay, yet at a zero cost to tax payers.

Government underwriting support for a large private project

The project In July 2009 the Victorian Government selected a winning consortium for the construction and operation of a 150 GL per annum desalination plant at Wonthaggi. The Project, due for completion by the end of 2011 has construction costs of A\$3.5 billion, making it the largest PPP announced globally during 2009. A long term off-take agreement to purchase all water produced by the plant with Melbourne Water, an entity wholly owned by the Victorian Government, provides long term revenue certainty for the project. .

Problem: failure to reach financial close Yet, despite the long-term State-backed off-take arrangement, the project sponsor had been unable to raise a significant part of the financing required by the time the winning consortium was announced. The shortfall was A\$1.7 billion equal to 46% of the project's capital costs.

Public finance solution The Victorian Government provided a "Treasurers Guarantee of Syndication" by which the State Government agreed to lend the funding shortfall at commercial rates if the project sponsor was unable to raise the amount by financial close. The debt shortfall was ultimately met by lending banks; so the guarantee was never called upon.

Source: Bloomberg

5.3.3 Cornerstone investor in share and green bond issues

As cornerstone investor in new share issues, the PSF would act as a quasi-investment bank, performing a market maker function. The objective would be to assist the development of new asset classes of shares and bonds so that the range of finance options for climate investments is expanded.

5.3.4 Credit enhancement, PSF involvement in insurance and guarantee products

Credit enhancement is key in lowering the risk rating of a loan in the internal due diligence process of a bank or in creating a security that has a higher rating than the issuing company.

This report believes that the large and growing number of public finance and commercial risk cover products allow just about any reasonable credit enhancement to be provided to projects. However, in the relatively low return environment of climate projects, the cost of the premiums may prevent planned projects from accessing required risk cover. Credit enhancement by the PSF may, therefore, involve partially buying down the cost of risk insurance, of partial risk guarantees and of partial credit guarantees.

In addition, the PSF may provide mezzanine finance to close equity gaps and subordinate bonds⁶⁷ to enable green bonds to be marketed to institutional investors.

5.3.5 Geothermal exploration and development corporation

About 40 countries in Central America and the Andean region, Eastern Europe, East Africa, Middle East, East Asia and the Pacific could satisfy a significant portion of their national electricity demand from geothermal energy. Geothermal power projects in countries with high-quality resources can offer their output at tariffs that are reasonably cost-competitive by RE-technology standards: around US¢ 8 per kWh.⁶⁸ Yet, it has been difficult to get projects off the ground, as high upfront investment requirements, geological risks associated with drilling and a typical five-year development timeline, from resource exploration to

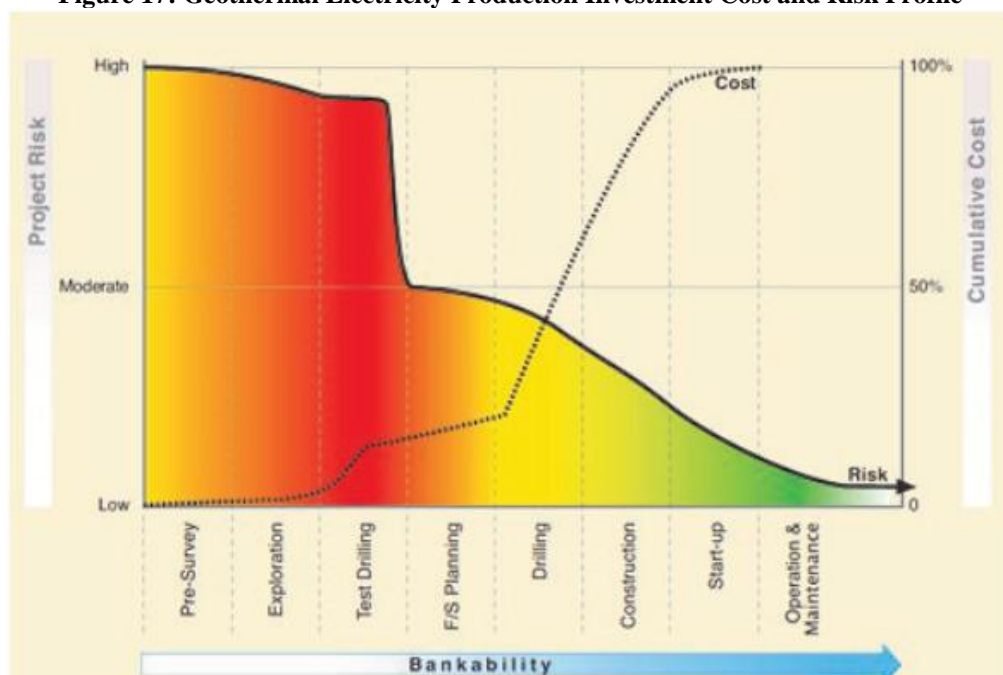
⁶⁷ In the credit enhancement of securities through issuing subordinate bonds, the subordinate bonds are allocated any losses from the collateral before losses are allocated to the Senior Bonds, thus giving these a credit enhancement.

⁶⁸ Source: ESMAP/ World Bank: "Geothermal Handbook". 2012

commercial operation present heavy obstacles.⁶⁹ Geothermal energy poses two resource risks for investors. During the pre-investment phase, rather large investments are needed to establish the geological resource potential at the investigated site, and checking whether it can be exploited commercially. During operation, the resource may turn out to be less attractive than estimated (lower than estimated temperature, higher than estimated mineralization), with the result that peak production capacity declines after a few year. Therefore, only 11 GW of geothermal power plant capacity is installed worldwide.

The hesitancy of private investors is not surprising as the high upfront risk of geothermal power projects comes on top of the general power project risks in developing countries. A breakdown of the cost of investment in a geothermal power plant may look as follows: permitting 1%, exploration 5%, confirmation 5%, drilling 23%, steam gathering 7%, transmission 4%, power plant 55%. This means that around 41% of the cost is on the geothermal resource side, a share, which is also roughly shown in figure 17 below.

Figure 17: Geothermal Electricity Production Investment Cost and Risk Profile



Source: ESMAP / World Bank: "Geothermal handbook", 2012

The high risks make it near to impossible to debt finance the exploration and development stages of a geothermal power plant project. Financing it fully with equity would increase the cost of production by up to 4 UScents/kWh.⁷⁰ Public finance program have tried to address this obstacle through various risk sharing approaches: by partially insuring project investors against the short-term up-front geological risk of exploration and the long-term geological risk and/or by providing non-recourse lending.⁷¹ Yet, they have little to show for in terms of private investments.

⁶⁹ Validating the availability of commercially viable geothermal resources through test drillings often requires US\$ 15-25 million per field. Source: ESMAP/ World Bank: "Geothermal Development Plan". 2013

⁷⁰ Source: ESMAP / World Bank: "Geothermal Development Program", 2013

⁷¹ The World Bank-GEF's ECA Geothermal Energy Program, started in 2004, set up a *Geothermal Energy Development Fund* with three financing windows: a technical assistance window, a partial risk guarantee window, and an Investment Funding Window. The *African Rift Geothermal Energy Development Facility (ARGe) Risk Guarantee Fund* gives PRGs to early stage exploration drilling, where there is a considerable probability of unsuccessful drilling.

The combination of (i) commercial viability in principle, (ii) large scale development potential in developing countries, and (iii) high deterring risks provides the justification for a PSF investment in the creation of the Geothermal Development Corporation, which invests in the early phases of resource exploration up to the point of a full feasibility study for a geothermal power plant based on proven geothermal potential. At that point, the Corporation can by tender sell the rights for the development of the project to a power plant investor at a profit.

An alternative for the GCF would be a risk sharing arrangement with a national geothermal development corporation, under which the investment program by the national corporation is supported by a mezzanine loan. Once the commercial feasibility of exploiting the resource is established, the project is tendered and the mezzanine loan is repaid from the proceeds.⁷²

Financing Geothermal Power Plants in Kenya – Institutional set-up

Resource exploration and development: The *Geothermal Development Company*, a state corporation, invests in geothermal resource and development programs in Kenya up to the point of steam production.

Geothermal power plant: The construction and operation of power plants using steam from fields drilled by the Geothermal Development Company is undertaken by *Kenya Electricity Generating Company (KenGen)*. KenGen is 70% owned by the Kenyan Government with the remainder listed on the Nairobi Stock Exchange (the rating of Moody's B2 and Fitch/Standard & Poors is B+). KenGen's total installed capacity is 1,232 megawatts. It plans to raise this to 1,750 megawatts by 2015 and to 3,000 megawatts by 2018 with a bias to geothermal production. Its 280 megawatt geothermal plant at Olkaria, the single largest geothermal power plant in Africa is scheduled for completion by 2016.

Financing of the geothermal power plants. In 2010, KenGen issued a 10-year public infrastructure bond on the national bond market which raised Sh25 billion for the upgrading of the firm's hydro power stations, boosting their capacity and efficiency, while the rest was used for the initial investments in the Olkaria plant. In 2013 KenGen intends to raise Sh30 billion (US\$345 million) from the national bond market through a 20-year bond to finance its investments in geothermal power production. The revenue generated from the sale of geothermal power will finance the repayments on the planned bond.

Source: Daily Nation, February 21, 2013

The text box shows how the taking off of the risk in geothermal exploration and production by a state owned corporation enables the investment in the power generation part of geothermal power production to be financed by bond issues on the national bond market in a developing country.

For later stage production drilling for advanced field assessment, the drilling-failure rate is much inferior; therefore, insurance for this to be provided on a commercial basis. The recipient of a guarantee will be charged a fee of 2-3% on the eligible drilling expense and payable upfront upon signing. The *Government of Chile* announced in 2009 a program to insure 30-70% of the costs of unsuccessful geothermal exploration wells. The dry-well insurance will be made available to any company that manages to secure a geothermal exploration concession. The first unsuccessful well will have 70% of its costs repaid by the government program; this will decrease to 50% for the second and 30% for the third. Total liability is capped at USD \$8 million. Under the *German Ministry of Environment's credit program "Resource Risk in Deep-Geothermal Exploration Drilling"*, KfW will lend to cover up to 80% of drilling projects comprising at least two deep-well drills in the business plan (production and injection drill). Maximum loan amount is €16 million per project. No collateral is required. Maximum tenor is 10 years, grace year is 2 years. The commercial Munich Counter-Guarantee Company (Münchener Rückversicherungs-Gesellschaft AG) collaborates with specialist advice and provides a partial counter-guarantee for KfW loans to project developers. KfW must protect its AAA-rating!

⁷² An alternative for the national corporation is to tender a tolling arrangement. The national energy regulator issues a tender for the electrification part of the project. The tender can be: for a steam purchase contract, in which case the electricity generator sells the electricity on the power market, or a steam-to electricity conversion contract, in which case, a state owned power company - provides steam to the plant without cost and accepts power generated from the plant against a conversion fee.

5.4 Finding the right niche for the PSF in public climate finance

For the PSF, the above examples reinforce the arguments for a flexible deployment of PSF finance instruments. But it also poses the difficult issue of finding the right niche for the PSF in the world of public finance instruments for low carbon investments. Public finance instruments in climate finance have three major niches. One is to reduce perceptions of elevated risk in the early stages of expanding investments in low carbon projects. These are transitory instruments, accompanied by intensive TA for capacity building. The other is to address systemic risk; e.g. loans to new-started SMEs. The third is to incentivise market and technology innovations.

In finding its niche, the first rule for the PSF is to avoid setting up facilities that compete with existing successful providers of public finance instruments in support of climate investments. It is more efficient for the PSF to provide additional finance to well-functioning initiatives managed by multinational development banks or donor entities. As example, the PSF can leave assistance in ‘early market development’ and financial sector capacity building’ in frontier countries, which have not yet passed these phases, to actors with previous experience in this area. Such interventions ought in to be components of the NAPAs and NAMAs of these countries and be served by assistance from ‘GCF Adaptation & Mitigation’.

The second rule is to avoid applying yesterday’s public finance instruments to the finance challenges of tomorrow. The situation in the commercial finance sector develops fast. Public finance investments in private equity and infrastructure funds for climate-related investments may have made sense a few years ago, and may be appropriate for specific sub-regions and project niches even today. But by the time the GCF becomes fully operational, the private finance industry will have moved deeper into climate finance already.

However, it is easier to apply these rules during the operational phases of the GCF, than a priori now to make concrete recommendations for what the GCF/PSF is to do once it becomes operational. Recommendations for interventions for the greening of the finance sector face the challenge that although the commercial finance sector develops very fast, it is difficult to foretell the future. Recommendations for green supply support face the challenge that donor priorities change and that well-functioning donor support in this area may be withdrawn a few years from now.

6 Greening the finance industry in client countries

6.1 What kind of transformation is called for in the finance sector?

The overwhelming importance of bank lending in developing country finance, and the fact that commercial banks are the dominant domestic private source of long-term debt finance in developing countries, has two implications for the green transformation to be assisted by the PSF.

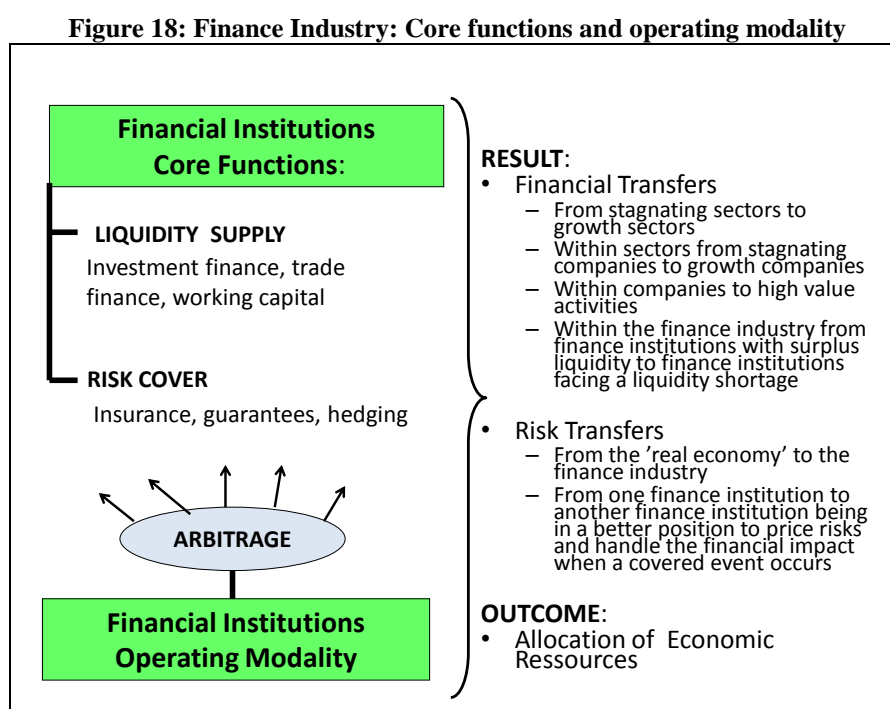
Firstly, it involves improving the terms and the conditions of bank loan finance making these more compatible with the capital intensive and long-term nature of climate investments. Major goals include increasing the tenor of loans to infrastructure projects and the share of non-recourse finance in bank lending.

Secondly, climate investments must be given increased access to capital market finance. Without an increase in the share of capital market finance, it will be difficult to finance the required scaling up of climate investments. Thus, the greening of the finance sector involves capital market deepening and widening.

6.2 Quality demands on green finance: liquidity and risk characteristics

6.2.1 A model of the basic operating modality of the finance industry

In order to understand the challenge the GCF faces in increasing the flows of finance to climate investments, one must understand the operating modality of the finance industry. In figure 18 below, the left side shows the operating modality of the finance industry, the right side the importance of the sector for the real economy: an efficient allocation of financial resources through the finance industry leads to an optimal allocation of the economic resources in an economy.



Source: Author

Stripped of non-essentials, the finance sector has two core functions: to satisfy investor demand for *liquidity* and for *risk cover*. It does so by exploiting *arbitrage opportunities*: at the heart is the intermediation process, transferring finance from people with money to invest to people wanting to invest, or providing insurance cover from institutions having the financial strength to do so to investors incapable of surviving financially if a catastrophe occurs; etc. This operating modality is not limited to the interaction between the real economy and the finance industry. The transactions are even more pronounced within the finance sector: a bank with surplus liquidity lends overnight to a bank with a shortage of liquidity; risk products – counter-guarantees, swaps, options, etc. - are traded intensively between finance institutions. Greening the finance sector, therefore, involves changing the arbitrage opportunities in favor of climate investments. It is done by instruments increasing the rate of returns on climate investments, lowering the risk of investing in climate projects and/or improving the liquidity of green finance products and for green climate investment.

6.2.2 The importance of liquidity

The *raison d'être* of banking is maturity transformation (turning short-term deposits into long-term loans) and liquidity transformation (funding illiquid assets by liquid liabilities). Liquidity – the ability to access money when an investment is to be made – is an around-the-clock necessity for the finance industry, which faces arbitrage opportunities non-stop.⁷³ To exploit a sudden investment opportunity, a financial investor must have a liquid asset in the portfolio to sell; if not, the investor is forced to borrow funds (or, in a shortening strategy, the financial assets to be purchased). In addition, prices of illiquid assets tend to be more volatile. *Illiquid assets, therefore, incur a risk premium in the form of a higher interest rate.* Institutional investors, for example, decide on investments in private equity funds by benchmarking their 'private equity' portfolios against 'public equity plus an illiquidity risk premium'.⁷⁴

Liquidity is also essential for *price setting* in the capital market: the price of a bond, which is traded infrequently, is more difficult to evaluate than the price of a bond which is traded each day. It will, therefore, incur an '*asset valuation risk*' penalty on top of the liquidity penalty.

The scaling up of climate investments requires access to finance from the capital market. For this to happen, the green finance products must be competitive in terms of liquidity. Bond issues on the capital market must be large, from US\$300 million and upwards; otherwise they are not liquid enough for institutional investors. Standardization - the development of standardized green finance products that can be packaged and sold to large scale investors – is a prerequisite, if medium to small scale project developers are to access the capital market.⁷⁵ Otherwise medium to small scale project developers must rely on bank finance, although some small to medium sized project developers have been able to sell small bond issues targeting the retail market.⁷⁶

⁷³ The emphasis on liquidity may seem economically excessive. It is driven by the prevalence of momentum investors on the market – investors who buy when prices are rising and sell when they are falling. Fundamental investors purchase assets based only on the expected future cash flows. But it is a reality which carbon finance has to adapt to.

⁷⁴ The cost of illiquidity is real: investors got their fingers burnt during the financial crisis when calls on their capital resulted in them having to sell private equity assets at distressed prices.

⁷⁵ The carbon market with standardised CERs, and EAUs is, therefore, deal for finance industry; except that the drop in prices during 2012 dropped the financial volume to such low levels that several large investment banks closed their trading units.

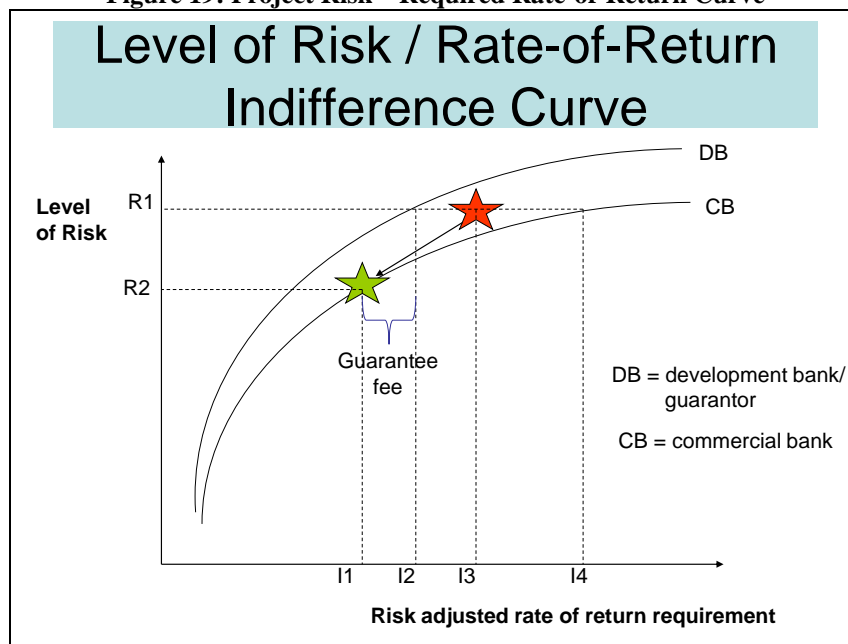
⁷⁶ Typically, households investing savings for their pension. Retail investors are individual investors who buy and sell securities for their personal account, and not for another company or organization.

6.2.3 Risk shifting for improving access to and the terms of finance

Risk, which cannot be shifted, can be an absolute obstacle for access to finance. It is, for example, impossible to get a house-mortgage without house insurance; new started small companies may not be able to access bank loans because they do not yet have a sufficiently long track record of positive balance sheets.

A more common obstacle is the impact of risk on a project's risk-adjusted rate-of-return. Project developers and lenders react to project risks and uncertainty by either (i) staying away from undertaking the activity, (ii) adjusting the risk-free rate of return upwards as compensation for accepting the risk, and/or (iii) taking insurance/hedging against the risk. In figure 19 below, the "project risk / rate-of-return" indifference curve (RR-line) shows how a project developer's (or lender's) asked for rate-of-return on equity (rate of interest) varies according to the perceived levels of project risks and uncertainties. Higher risks are accepted if compensated for by higher potential returns. CB is the RR-line for a *commercial bank*; it indicates the rates of interests it charges as a function of project risk. DB is the RR-line for a *development bank, or alternatively, for a guarantee entity / insurer*. A developer has submitted the red project to the bank for loan finance. The project has level of risk rated at an R1. The maximum rate of interest, which the developer can afford to pay for the debt, is I3; at a higher rate of interest, the project will not to break even and generate an acceptable rate of return on his equity (RoE). However, at the R1-level of risk, the bank prices its debt product at the higher interest rate of I4. Faced with that cost of debt, the developer cannot implement the project. The project faces a debt finance gap: unless the project's cost of debt can be decreased.

Figure 19: Project Risk – Required Rate-of-Return Curve



Source: Author

Risk insurance products and credit guarantees exploit the arbitrage opportunities arising from differences between actors with regard to their (i) risk-taking willingness or (ii) financial loss-absorbing ability and/or (iii) access to information about the inherent risks of a proposed transaction. Better information about "true" project risks turns what is an uncertainty for one actor into a risk for another.⁷⁷ In the chart, assuming that DB is the indifference curve for a development bank, the project developer could obtain a loan from that

⁷⁷ The difference is that probabilities can be assigned to risks, which enables risk insurance products to be priced.

bank at the interest rate of I_2 . (The development bank prices project risk lower because it takes positive external benefits into account.) Alternatively, assuming that DB is the indifference curve for a guarantee agency or an insurance company, then a guarantee agency or an insurer would charge a fee of ' $I_2 - I_1$ ' to take on a risk equal to $R_1 - R_2$. The developer can, therefore, pay a guarantor a fee of ' $I_2 - I_1$ ' for a partial credit guarantee to the bank's loan, which reduces the risk level faced by the bank to R_2 . At the R_2 risk level, the bank charges the developer the rate I_1 for its loan. The developer's total cost of debt is I_2 : the cost of the loan plus the cost of the guarantee. Alternatively, the bank could charge the developer an interest rate of I_2 and offload the unwanted risk to an insurer or through a hedging instrument against a fee of ' $I_2 - I_1$ '.⁷⁸

That off-loading of risk results in an overall decrease in the cost of capital for climate projects is an ideal situation, which is rarely met in real world situations; even less so in climate projects in developing economies. It can happen in sophisticated financial markets with a long range of hedging products. In developing countries, this will rarely happen. In these guarantees will be an enabler of access to capital, not an instrument for reducing the cost of capital.

6.2.4 Rating of risk – rating of bonds by rating agencies

Bond issues of climate projects require effective partnerships between banks, investors, project sponsors, rating agencies and public sector actors. The rating by a rating agency of the bond issue of a low carbon project focuses on the risks of construction and operation of the project (technology, resources risk, counterparty exposure – the quality of the counterparties in both the construction and operations phases), the project's long-term competitive position in the market, existence of off-taker risk, its legal characteristics (e.g. the role of the controlling creditor in a multi-lender project financing), refinancing risk (the risk that existing project debt with a bullet maturity cannot be repaid from a new borrowing or other refinancing because the terms of such new borrowing or refinancing are uneconomical) and its financial performance. Third-party support during the critical construction phase through counterparty guarantees, performance bonds, insurance packages and liquid security helps the rating.

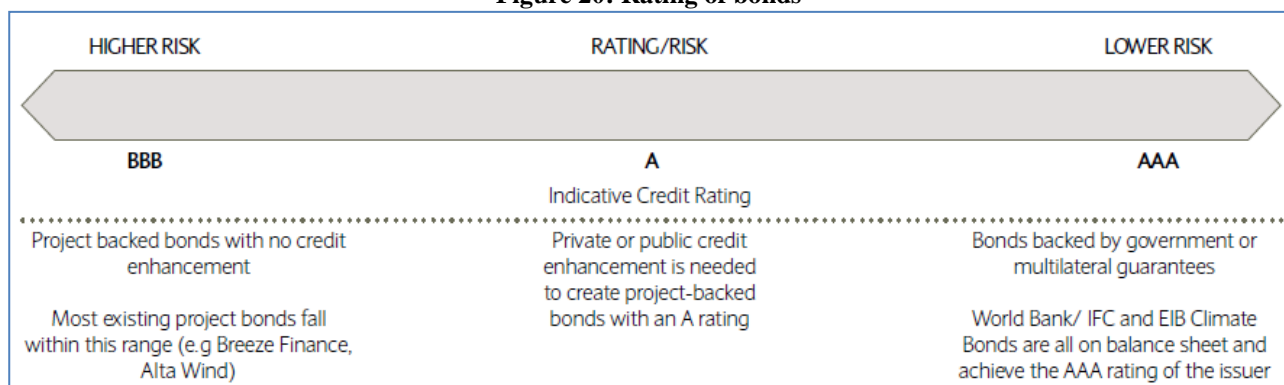
Financial sector regulations permit banks and institutional investors to invest only in investment grade bonds, meaning at least a BBB rating from Standard & Poor or a Baa rating by Moody. Active involvement of institutional investors in project finance through the bond finance market therefore requires that issued project bonds achieve at least investment grade status. However, institutional investors have a preference for 'AAA' and 'AA' (high credit quality) bonds rather than in 'A' and 'BBB' (medium credit quality) bonds.⁷⁹ To achieve investment grade rating of a bond issue from a low-carbon project will, therefore, require 'wrapping' of green bonds by a guarantee; insured/guaranteed bonds are called 'wrapped bonds'. In such cases, the credit rating of the insurer is implicitly transferred to the insured bonds. In addition, the analytical work of the insurer permits investors to invest in low carbon project bonds without having the specialist expertise to appraise complex low carbon project structures.

⁷⁸ An example is the guarantee issued to the solar power project bond for the Montalto di Castro solar park, see the text box in section 6.3.1.

⁷⁹ Institutional investors must downgrade their rating level ambitions. "The global pool of government bonds with triple A status from the three main rating agencies, has shrunk more than 60 per cent since the financial crisis triggered a wave of downgrades across the advanced economies. ... The expulsion of the US, the UK and France from the "nine-As" club has led to the contraction in the stock of government bonds deemed the safest by Fitch, Moody's and Standard & Poor's, from almost \$11tn at the start of 2007 to \$4tn in March 2013. ... The shrinkage is encouraging investment flows into emerging markets and forcing investors and financial regulators to rethink definitions of "safe" assets". Source Finance Times: "Global pool of triple A status shrinks 60%". 27.03.2013

Figure 20 shows that guarantees, depending on the extent of the guarantee coverage and the rating of the guarantor can raise the rating of a bond issue from BBB to A and to AAA.

Figure 20: Rating of bonds



Source: Accenture & Barclays (2011)

Before the 2008 financial crisis, the investment grade status requirement was fulfilled by having capital market issuances in the RE-sector be insured by monolines insurers⁸⁰ with AAA credit ratings. The monoline that insures senior debt service also acts as the controlling creditor under the intercreditor arrangements in a multi-lender project financing. However, most monolines lost their AAA credit ratings during the financial crisis and this source of insurance cover dried up.

Public finance initiatives, therefore, have sprung up to fill the gap. As can be seen from the text box on the Montalto di Castro solar farm in Italy, the 75 percent guarantee by SACE, the state-owned Italian guarantee company, lifted Moody's rating of the project bond from Baa3 to Aa2. The "Europe 2020 Project Bond Initiative", of the EU Commission working in collaboration with the EIB, seeks to lift the rating of bonds issued by low-carbon projects from a 'BBB' to an 'A' by providing credit enhancing support to the most senior tranche of debt: an EIB loan takes from the start of the project taking a subordinated position as a permanent part of the project's capital structure. It will also guarantee the debt service payments on the bonds through a contingent credit line provided by the EIB to support debt service.

However, credit enhancement itself might not be sufficient to enhance the credit quality of a weak project. Another complicating issue is the rating of the developing country in cases where the sovereign or a counterparty owned by the sovereign is the direct or indirect off-taker to the project contract. If the country does not enjoy investment grade status, this will impact negatively on the rating of the project.⁸¹

6.2.5 The importance of market size and of the sophistication of national financial markets

The *potential volume of annual private investment in low-carbon projects* has a huge impact on the interest of the finance sector to engage in climate finance, and invest in building the in-house capacity to do. If the market looks small, it is difficult to get the sector involved. If the potential market is large, then public finance interventions will succeed in getting low-carbon finance accepted as a new asset class.

⁸⁰ An insurer writing only a single line of insurance contracts, e.g, credit insurance.

⁸¹ Source: Standard & Poors: How Europe's Initiative to Stimulate Infrastructure Project Bond Financing Could Affect Ratings, May 16, 2011

In addition, *the size, depths, liquidity and sophistication of the finance sector in a country* determines both which public finance instruments can be employed successfully to engage private finance and which new green finance products can be introduced on the market with the help of public finance instruments.⁸² This is seen most clearly in the application of publicly backed guarantees, the most widely employed public finance instrument for shifting risks. Publicly backed guarantee programs are used to add new arteries to the financial system; expand the diversity of financial products, and increase liquidity and tenor.

When *used as stand-alone instrument*, the capital mobilizing function of publicly backed guarantees is best performed in financial systems that have (i) sufficient liquidity (strong flows), (ii) a well developed financial market infrastructure (many arteries), (iii) market interest rates that are reasonably attractive (that is, have rates not so high that they represent *prima facie* a deterrent to borrowing), and (iv) local currency loans (so borrowers need not face any foreign exchange risk).

Where such financial market conditions are not found, publicly backed guarantees are used as elements in complex public *finance packages that target the opening of new financial arteries* in the finance system.⁸³ By reducing market-entry risks for lenders contemplating new products, publicly backed guarantees reduce aversion to new types of lending. By bringing young technology firms in early contact with debt finance, publicly backed guarantees assist these in establishing banking relationships.

⁸² For the GCF Board's defining of up policies and objectives for the PSF's assistance to the greening of the finance industry the uneven development of the finance industry in GCF-client countries poses a real challenge. Even between the two largest economies in Asia, India and China, the differences are striking: India's commercial banking system has assets of about \$1.5tn, less than those held by any one of the four largest Chinese banks. Source: Financial Times: "India must do more to open up banking", 24 March 2013

⁸³ Source: Wolfgang Mostert: "Publicly-Backed Guarantees as Policy Instruments for Promoting Clean Energy", 2009

6.3 Assisting the banking sector in developing green finance products

6.3.1 Barriers restricting the ability of banks to lend

The two most important barriers restricting the ability of banks in ADB client countries to provide bespoke products in climate finance are (i) restrictions on the length of tenor and (ii) the novelty (risk) of climate investments.⁸⁴ In addition, the volume of local bank finance is determined not just by the willingness of banks to lend, but also of the willingness of investors to borrow from the local banks. If the terms offered by the banking community are not good enough, the demand for loans and the implementation of climate investments will be below the politically desired level. Interest rates may be too high due to macro-economic or specific financial sector conditions in the country. Loan tenor may be too short, making it impossible for project cash flows to cover the amortization payments. Unwillingness of local banks to engage in non-recourse finance and pressure on the balance sheet of investors can force these to turn to international banks for project finance.

6.3.2 Frontier country instrument: lowering the cost of a bank's entry into climate finance

Assistance to lower the cost of entry into climate finance has been an effective 'standard instrument' to get banks involved in climate finance during the initial market development phase of new technologies. An example of such projects is the UNEP Solar Loan Programme, summarized in the text box below.

India - UNEP Solar Loan Programme.

Program objective The objective of the program was to motivate CFIs with a large number of bank offices in rural areas to engage in solar homes system finance.

Cost-sharing public instruments Participating local banks received a transaction cost support in the form of a fee paid per closed loan.

Grant funded capacity building Grant funds were used for training and other capacity building activities, including qualification of SHS vendors. The banks receive training and assistance in business planning and marketing of the SHS loans.

Standardisation Simplified loan application and procedures were used to process the solar loans to make them more appealing to the targeted households.

Support to market expansion The local banks lend to borrowers at their commercial rate. A UNEP-financed interest rate subsidy for borrowers, calculated as an amount equivalent to buy down the interest rate (for example from a 12% commercial rate to only 6%) over the term of the loan, is placed on deposit with the bank and applied to offset the borrower's last monthly payments. Hence, the customer would only get the subsidy, equal to 2-6 monthly loan payments on a five year loan, after successfully repaying the loan portion owed by him. The partnership between the vendors and the banks and the subsidized loan helps to promote the sale of SHS to an annual level that makes lending to SHS commercially interesting for the banks also after the termination of the program.

Impact: The programme disbursed around 19,500 loans, with 2076 bank branches participating in the programme and 5 qualified vendors.

Source: Various

The project concept was clever: (i) It lowered the cost of market entry through capacity building and through transaction cost sharing. (ii) It assisted the development of a mass market (a prerequisite for continued

⁸⁴ We speak of barriers intrinsic for the finance industry. Lack of transparency in government policy, for example, is a barrier for climate investments, and deters banks from lending; but it is not a market failure of the finance sector.

commercial bank interest) for the solar finance product by providing a grant to consumers; the ‘keeping up with the Jones’ effect is expected to maintain a mass market for stand-alone solar PV-systems at the end of the project. (iii) The grant payment was designed to incentivize the loan takers to comply with their amortization payments – it applied to the last two amortization payments!

However, the project is an example of the type of initial stage project which will have lost most of its relevance by the time the GCF becomes fully operational. It can, therefore, be left to other donors to apply it.

6.3.3 Expanding loan tenor using de-risking instruments

Publicly-backed guarantees (PBGs) can be used to assist beneficiary investors in (i) getting access to finance, and (ii) to expand the tenor of bank loans and/or grace periods to better match project cash-flows.⁸⁵

PBGs as instruments for expanding loan tenor

The primary purpose of publicly backed partial credit guarantees is to provide developers and end-users with access to debt finance that otherwise would not be made available by the finance community to the investor, for example, because fully satisfactory collateral is not available. However, in sophisticated uses, PBGs improve the terms of the loans by extending the tenor of loans.

The PBG-modality used by GuarantCo⁸⁶ for extending tenor is to *guarantee refinancing of a loan* at the end of the normal tenor period. If a developer seeks a 10 year loan, but the tenor of available loans is 7 years only, the loan can be structured with a repayment schedule similar to a ten year loan, but with a bullet payment equal to the remaining principal at the end of the 7th year. GuarantCo provides a *guarantee to the bank for the repayment of all outstanding debt in year 7*. However, the fees and margin payable to the local bank and to GuarantCo are structured to provide an incentive for the local bank to refinance the loan at the time, so it would continue with the financing for the full ten years. If the bank is unwilling to refinance the loan, it comes on the books of GuarantCo. The amortization payments are now paid to GuarantCo, unless GuarantCo opts to sell the loan to a local commercial bank.

A different PBG modality was tested by the World Bank in the China Ertan hydropower project. It issued a US\$50 million *partial credit guarantee covering the maturities during years 13-15* of loans to finance the expansion of the plant. The guarantee agreement expanded the tenor of the loans from 7 to 15 years, as the commercial banks agreed to expand the tenor not covered by a guarantee by the years 8-12.

Take-out facility

For the PSF, investing in setting up a *take-out facility* - somewhat resembling GuarantCo’s approach, may be a more appropriate solution - because it generates revenue - than the subsidized PBG-modality. A take-out

⁸⁵ A publicly-backed guarantee (PBG) is a contractual obligation by which a government (institution), against payment of a fee, assures compensating payment to a lender or an investor in case of default on an obligation that another party is committed to. Whereas insurance involves two parties, guarantees involve interlocking contracts between three parties. In the case of partial credit guarantees (PCGs), the contracts are between *lender* and *borrower* (loan agreement) and between *guarantor* and lender (guarantee agreement). In the case of partial risk guarantees (PRGs), the contracts are between *guarantor* and *investor/lender* and between guarantor and the *host country government* (for example a commitment to pass a law introducing feed-in-tariffs).

⁸⁶ GuarantCo was developed and is financed by the Private Infrastructure Development Group (PIDG), a multi-donor organisation. Members include: the UK Department for International Development (DFID), the Swiss State Secretariat for Economic Affairs (SECO), the Netherlands Ministry of Foreign Affairs (DGIS), the Swedish International Development Cooperation Agency (Sida), the World Bank and the Austrian Development Agency (ADA).

facility offers lenders the option to transfer *longer-than-normal tenor loans* the finance vehicle either at the end of a *normal tenor period*; or even a couple of years before that. The higher liquidity of the latter option increases the attractiveness of giving green loans for lenders. The facility would not accept defaulted or soon to default clients. The take-out facility can keep transferred loans on its balance sheet until maturity, transfer them to other interested parties or securitise a large number of loans for a short term bond issue. The entity would need to build in margin risk, liquidity risk and project risk insurance.

6.3.4 Getting banks involved in non-recourse finance, the case of India

The GCF may engage with financial sector regulators in order to promote non-recourse finance by local banks whilst simultaneously offering banks risk reduction support.

The example below, of ADB's US\$150 million 'India Solar Generation Guarantee Facility (ISGGF)' made available to commercial bank loans for small-scale solar plants in India, illustrates the difficulties, which the introduction of non-recourse finance faces on the regulatory side and inside the finance sector.⁸⁷

In India, local *project finance* (non-recourse finance) of projects is almost absent, except for very large projects where MDBs and large foreign banks provide the bulk of the finance and local banks have a minor participation in the syndicated bank loans to the project. *Balance-sheet-finance* is the overwhelming finance modality.

The Indian Government's Jawaharlal Nehru National Solar Mission (JNNSM) has the target of achieving 22,000 MW of solar installations by 2022. The NSM and solar programs of various Indian states (Gujarat, Rajasthan, etc) organize tenders for the allocation of long-term PPAs to solar projects. An example is Rajasthan's 100 MW 'reverse auction' tender in early 2013, where developers could bid required long-term PPA-tariffs with the signing entity, Rajasthan Renewable Energy Corporation Limited, for either 5 MW or 10 MW projects.

Solar project developers in India face high interest rates. Solar projects financed by Indian banks, non-bank financial companies (NBFCs) and infrastructure funds end up paying an interest rate of over 13% per annum. This makes the domestic cost of borrowing high and can put significant pressure on deal economics.⁸⁸ Normally, only loan tenors from 8 to 12 years are available for sponsors of RE-projects.

Two types of bidders operate on the utility scale solar PV-market in India: project development companies not backed by an Indian corporate and companies backed by Indian businesses with multiple interests.

The latter can make use of accelerated depreciation benefits, a policy instrument to promote investments in grid connected wind energy and PV-systems in India under which 50-100% of the cost of investment can be written off against the corporate tax payments for that fiscal year. They can avail recourse-based debt finance for the projects, financing their projects on-balance sheet with the backing of a corporate guarantee. The weakness of the accelerated depreciation instruments is that the multi-sector corporations invest in solar PV-projects primarily to benefit from the accelerate depreciation cash-flow; less attention is paid to

⁸⁷ ISGGF is provided by ADB's 'Asian Solar Energy Initiative', which intends to finance 3,000 MW of solar capacity by 2013 in developing Asia, mainly in India, Thailand and China. Most of the (first phase) solar projects in India (average size of 10-15 MW) are too small for direct funding by ADB. Instead, the PCG was designed for these.

⁸⁸ International financing from export credit agencies (ECAs) such as the US EXIM bank and development finance institutions (DFIs) such as the IFC has helped some developers secure a lower cost of debt. Even after completely hedging for currency, a project is able to derive a rate differential of around 100 basis points. Source: Bridge to India

developing a project that maximizes the production of power from the installed capacity. Operation also tends to be less than optimal.

The independent developers cannot make use of accelerated depreciation benefits because they do not have large annual tax payments to make. They get all their benefits from the maximization of revenue and the minimization of operational expenses; which is why the quality of their projects on average is higher than for corporate backed developers. The independent developers have more difficult access to debt finance because of lower ability to take on recourse-based debt finance and the unwillingness of Indian banks to engage in project finance. Non-availability of non-recourse financing is a critical hurdle in the expansion plans of developers as they cannot continue to accumulate recourse on their balance sheets.⁸⁹

One obstacle to non-recourse comes from regulatory system for finance. A problem not restricted to climate finance is that lenders have concerns with debt recovery and the legal enforceability of claims. Even cross-defaulter clauses of converting debt into equity only have a limited appeal. However, the 'Recovery of Debts Laws' passed in December 2012 in the Indian parliament and recent modifications of debt-recovery rules will make it easier for banks to recover bad loans and thereby to make more non-recourse financing available in the future.⁹⁰

The other obstacle comes from the due diligence process of the banks. Banks regard lending to utility scale solar projects as relatively high risk - estimated at B-BB – due to two major concerns. The first is the limited availability of irradiation data, which forms the basis for projecting future revenues; the margin of error for irradiation data at specific locations can be as high as 10%. The second is doubt about the strength of public power purchasing agreements (PPAs): roughly 70% of all renewable purchase obligations have to be met by Discoms that are in bad financial health.⁹¹ Tamil Nadu and Kerala have opted to pass the financial burden of renewable purchase obligations from the state-owned distribution company to large power consumers, who are obliged to purchase Renewable Energy Certificates.⁹² Their risks relate to the enforcement of the solar purchase obligations, which create the demand for RECs.

As many projects faced delays, MNRE realized that many inexperienced project developers looking at solar project development only from the perspective of accelerated depreciation will prohibit the NSM from achieving its targets. In order to attract larger sized projects by experienced developers; MNRE increased the limit of allocation per developer from 5MW under the batch one of phase one of the NSM to 50MW under the batch two of phase one of the NSM. The India Solar Generation Guarantee Facility (ISGGF) seeks to support the Government in its efforts by improving the ability of independent project developers to access non-recourse debt finance. ISGGF makes a 50% pari passu partial credit guarantee (PCG) available to bank loans for solar projects. The PCG can be structured flexibly to enable banks to expand the tenor of their bank loans. As long as the present value of the debt service obligations guaranteed by ADB does not exceed 50% of the project's debt, the guarantee can be structured according to the individual preferences of the

⁸⁹ Some succeed. According to Bridge to India, 'Bankability and Debt Financing for Solar Projects in India', 2013, the ability to raise equity from prominent international financial investors such as Goldman Sachs, the Blackrock Group or Apollo Management and multilateral financial institutions such as the IFC can help build the case for non-recourse debt.

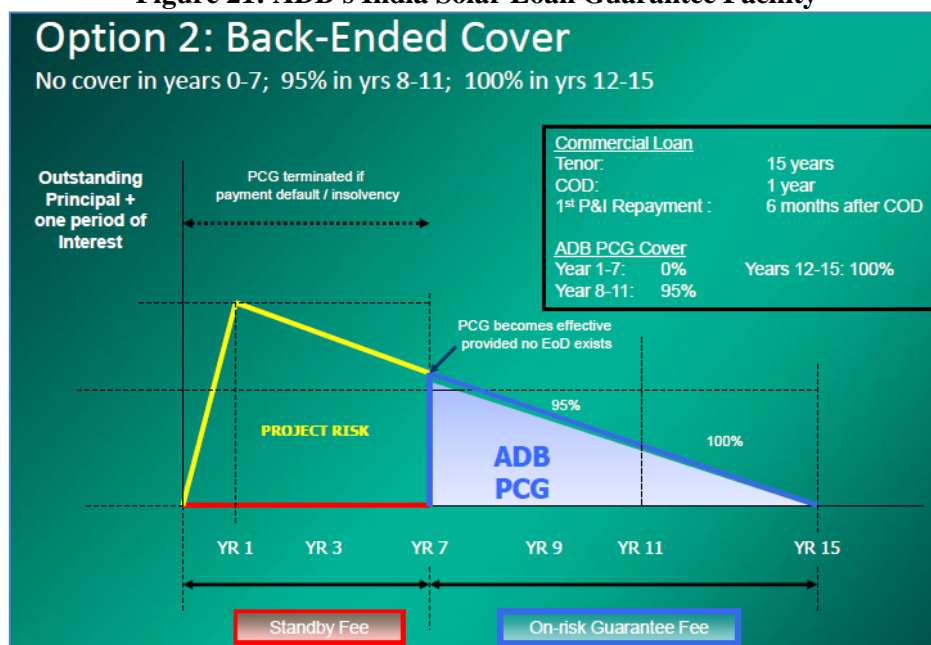
⁹⁰ Debt claims worth more than US\$ 40 billion are pending in debt recovery tribunals. Source: Bridge to India (2013)

⁹¹ NTPC VidyutVyapar Nigam, a government-owned power trading company, has been the off-taker for projects allocated under the National Solar Mission. It has AAA rating.

⁹² Kerala's Solar Procurement Obligation (SPO) scheme is mandated for commercial consumers with a connected load of more than 20 kVA and industrial consumers with more than 50 kVA and for consumers connected to the high tension and Extra High Tension transmission networks. All HT and EHT consumers have to procure 3% of their power from solar until March 2014 and 6% from April 2014 onwards.

participating banks. Banks can chose a straight 50% cover for 15 years; or focus most, or all, of the guarantee cover on the later years. The chart below shows, as an example, the option of zero cover during the first 7 years, 95% cover during years 8-11 and 100% cover during years 12-15. With 100% cover the bank does not need to put up a capital reserve against the outstanding principle.

Figure 21: ADB's India Solar Loan Guarantee Facility



Source: Capital Markets Climate Initiative website

However, according to the UK's International Climate Fund (ICF) on its website, there is no uptake for the guarantee because there is "a gap between the pricing of guarantees required by ADB's internal risk management policy for private sector operations and the fee rates private sector developers and banks are willing to bear."⁹³ The ICF, therefore, provides a £6 million grant to buy down 50% of the financing cost of using ADB guarantees.⁹⁴

ADB's fee rates are shown in the table below.

Table 4: Fee rates for ADB Partial Credit Guarantees

| Type of Fee | Fee rates | |
|---------------------------|-------------------|--|
| Commitment fee | 0.43-0.63% p.a. | calculated over the Guaranteed Percentage of any undisbursed Principal amounts during the Availability Period |
| Guarantee fee | 0.87 – 1.25% p.a. | calculated over the Guaranteed Percentage of the amount of outstanding Principal and Interest accrued |
| Standby fee ¹⁾ | 0.55% p.a. | calculated over the Guaranteed Percentage of the amount of outstanding Principal as from the Effective Date of the PCG |
| Upfront fee ²⁾ | 0.20% flat | calculated over the Guaranteed Percentage of the Guaranteed Loan, payable within 7 business days of financial close |

- 1) The Standby Fee is only applicable and payable from date of signing of the PCG until the Effective Date if the Guaranteed Lender opts for back-ended PCG cover
- 2) If the Guaranteed Lender opts for back-ended PCG cover, the Upfront Fee shall be 1.00% flat calculated over the Guaranteed Percentage of the amount of outstanding Principal at the Effective Date

⁹³ Source: Capital Markets Climate Initiative: "Scaling up solar in India through public-private action", 2011.

⁹⁴ Early 2013, only two commercial banks have been approved by ADB as eligible partners: L&T Infrastructure Finance Company Limited (India) and the Norddeutsche Landesbank (Germany).

The front-end fee is a one-time payment that covers due diligence, processing of the guarantee, and other up-front costs. The commitment fee is applied to the amount of any guaranteed principal that has not yet been disbursed. The annual guarantee fee covers ADB's exposure to the project and is charged on the guaranteed portion of principal outstanding, and the guaranteed amount of interest in an applicable interest period. Together, they add close to 200 percentage points to the interest rates charged by Indian banks.

The need to subsidize the subsidy fee is puzzling and may, at first sight, raise a question mark concerning the appropriateness of ADB's guarantee instrument in India. Indian banks obviously conclude that the financial value of the estimated default rate on loans multiplied by 0.5 is lower than the cost of ADB's fees, otherwise they would adjust their rate of interest downwards equivalently; so the total cost for developers (who pay the fee) is unchanged. ADB experts noted in their discussions with potentially interested banks in India, that these raised the internal rating of guaranteed loans only by a notch or two; but not sufficient to absorb the cost of the guarantee by an offsetting reduction in the 'net-of-guarantee rate of interest'. U.S. or EU based banks using different risk assessment models maybe would have.

The extreme price elasticity of the demand for PCGs to solar project loans in India can be explained by the razor sharp competition on the Indian solar power market. There is no demand for an unsubsidized guarantee from the side of developers as the cost would prevent them from preparing competitive bids.⁹⁵ Bid tariffs for solar PV-PPAs in India have been incredibly low as developers in a situation of falling PV-prices from 2009 to 2012 priced their bids for tariffs on the expected cost reductions in the procurement price for solar PV-systems between the bidding date and the procurement date. The guarantee subsidy marginally improves the competitive position of independent project developers, who need a guarantee to access non-recourse loans at a cost of capital which enables them to prepare a price-competitive bid.⁹⁶

The promotion of non-recourse lending will be high on the agenda of the PSF. The present limited ability of utilities in EU-countries to expand their investments – see section 2.2 – illustrates the importance of non-recourse lending for the sustainability of large scale investment programs. Subsidy support to reduce the cost of partial credit guarantees and of partial risk guarantees – offered by commercial providers or by development banks to non-recourse loans of commercial banks – can be an interesting transitional instrument for getting non-recourse lending expanded on a market and make banks more comfortable with the modality.

6.3.5 Mainstreaming EE-finance in bank lending

The investments in EE-finance have continued to lag behind the expectations of policy makers and of development banks. The PSF, in choosing its approach to the subject has the advantage of being able to look at the experience of two contrasting approaches: the IFC's 'project finance' approach and the EBRD's 'mainstreaming approach'.

The IFC has implemented a number of EE-finance projects in Eastern Europe and in Asia more or less according to the same formula combining: (i) capacity building of ESCOs in performing energy audits, (ii) capacity building support to collaborating banks in the evaluation of EE-projects, (iii) a partial risk guarantee to bank loans for EE-projects, (iv) an on-lending or refinancing facility.

⁹⁵ The situation is particularly tough in in Tamil Nadu, Andhra Pradesh and Rajasthan, as these states have opted for the so-called L1 process, wherein developers are asked to meet the lowest bid in a tender.

⁹⁶ The website of the Capital Markets Climate Initiative makes the misleading claim that its subsidy leverages £265 million in private investment. However, since the cumulative MWs which are bid in Indian tenders exceed the tendered MWs by a large margin, the subsidized PCG does not leverage investments in the short to medium term. The transformative benefits from making non-recourse lending available to professional project developers will be felt first in the long term when non-recourse lending facilitates the scaling up of low-carbon investments.

The EBRD took a different approach in promoting investments by manufacturing industries in EE. The EBRD made general modernization loans available to industries through its collaborating banks. It also trained ESCOs in performing energy audits. The approval of a loan request for a modernization loan was made conditional on the performance of a ‘free-of-charge’ energy audit at the manufacturing plant, the result of which had to be presented to the firm’s chief finance officer. If the CFO decides to add an EE-investment component to the modernization loan, the bank will not impose a collateral requirement on the EE-part of the loan. As EE-investments reduce the operating costs of the plant in a profitable manner, they are seen as a means to increase the ability of the company to repay the modernization loan. However, the chief finance officer can decide to proceed with the request for the modernization loan without adding an EE-component to it. Not taking up the offer for an EE-loan will not influence the approval of the modernization loan.

The PSF can test the EBRD approach in collaboration with larger national development banks and larger national commercial banks. Unlike the EBRD, the PSF cannot make modernization loans available alongside an EE-loan facility. But it can apply the basic project concept of the EBRD by making available (i) grant-financed TA for preparing energy audits, (ii) TA to banks for the understanding of the concept of energy audits and the appraisal of EE-loans, (iii) TA to energy audit companies and (iv) a refinance facility for EE-loans, which are offered to industrial firms seeking a major loan for the expansion and/or modernization of an industrial plant.

6.4 Greening the bonds market

6.4.1 Capital market deepening

The sustainability of green finance is stronger and more cost-effective when a broad spectrum of financial instruments is available to support long-term investment and when long-term finance is supplied by entities with committed long-term horizons. This means increasing the share of finance from the capital market. Capital market deepening is a very ambitious discipline to engage in - India has been trying to get a corporate bond market going for 15 years and the latest India Five-Year Plan has this as a priority. But, it is essential for the transformation to large-scale climate investments in the future.

6.4.2 Introducing green bond issues on national markets

For large projects and large corporations, the international bond market provides an alternative to syndicated bank loans.⁹⁷ In countries, where the volume of climate investments is large enough -, bond finance can be a valuable tool for increasing local debt finance for climate investments, both as secondary source of finance (= refinance), but also as a primary finance source. There are three reasons for this.

First, the bond market provides an exit for banks. It is easier for banks to provide debt finance for construction if the capital market offers a refinancing facility in the form of a bond issue upon the commissioning of the constructed plant. The banks’ role is then no longer to provide long-term debt finance, but to act as the mediators between the project developers and the capital market. This limits the impact of

⁹⁷ In March 2013, the Suzlon Group completed a US\$ 647 bond issue by its wholly owned subsidiary – AE Rotor Holding (AERH). The US dollar-denominated bonds with a 4.97% coupon have a five year bullet maturity will be listed on the Singapore stock exchange (SGX). Backed by a Stand-By Letter of Credit (SBLC) from State Bank of India, the Bond is the first ever USD credit enhanced bond from India. It was provisionally rated at Baa2 by Moody’s. Source: Suzlon press release March 26, 2013.

construction finance on the banks' balance sheets to the interval between the initial financing of the project and the securities being placed.⁹⁸

Secondly, bond financed debt can increase tenor beyond available tenor on long-term loans from local banks.

Thirdly, bond issues on the local capital market can be an instrument for getting local institutional investors to place part of their portfolio into climate finance. This expands the refinancing options for the local bank sector.

The outlook for an increased role of bond finance in ADB client countries is positive. One of most remarkable shifts in international finance is the rapid growth of the domestic bond markets in developing nations, which over the past decade grew fivefold to about US\$10 trillion by late 2011. In Asia, excluding Japan, ordinary companies issued US\$78billion of bonds in US dollars, euros and yen in 2012, a record annual amount and, for the first time, more than they had borrowed via traditional syndicated loan markets.⁹⁹

This report sees a midwife role for the PSF in the birth of green bond markets in developing countries. The objective of PSF support to green bond issues is get green bonds be seen and entrenched on the market as safe, high-quality assets. Marketing the environmental quality of green is a motivator for too few 'socially responsible' investors; by marketing the safe asset quality of green bonds, a broader investor base can be reached.

The institutional investors receive much attention in debates about the GCF. But considering the lack of success so far, it may be more productive for the PSF to assist the marketing of green bonds to a broad category of investors. In view of the substantial household savings that are placed in low-interest yielding Asian bank accounts, the introduction of green retail bonds may be a promising option.

The green bonds, as a new asset class, lack a history. During the introductory phase – say the initial five years until a first history has been established enabling rating bureaus to rate new bond issues objectively - it is likely that the bonds need to be wrapped if they are to find buyers. The cost of the guarantee is a first mover cost, which it would not be reasonable to impose on the first investors alone, also because this may increase the cost of bond capital to a level that makes the bond issue uninteresting for project developers. To get green bonds introduced and established on a national market, the PSF may subsidize the cost of credit guarantees for the first bond issues.

Being a new asset class, the first green bond issues on the market may fail to find sufficient off-take. The PSF's 'underwriting' facility can anticipate this situation by serving as anchor investor for a significant share of market testing new bonds. Getting a first green project bond off the ground can be quite a complex process, see the text box below on the Montalto di Castro solar park. The structure for the issue was conceived by the EIB.

⁹⁸ The developer may benefit from an overall reduction in the cost of capital, if, after commissioning costly bank finance is replaced with less costly bond finance. However, due to the transaction costs of bond issuance, a reduction in the cost of capital may not occur.

⁹⁹ Source: Financial Times, January 31, 2013

Wrapped tranche for solar power project bond for Montalto di Castro solar park.

The developer The US firm SunPower Corporation manufactures solar energy systems and acts as solar power project developer.

The project The bond issue is used to refinance the final two 44MW phases of the completed Montalto di Castro solar farm in Italy. The lead managers for the issue were BNP Paribas and Société Générale.

The bond The 18-year fixed rate bonds were issued in two €97.6 million tranches. The first tranche was guaranteed 75% by SACE, the state-owned Italian guarantee company. The tranche was rated Aa2 by Moody's. It pays 5.715% and was sold to institutional investors. The second tranche was 'naked' (without a guarantee) and rated Baa3. It pays 4.839% and was purchased by the European Investment Bank (EIB). The higher payment rate on the first tranche covers the cost incurred by institutional investors for the guarantee; meaning a price of 0.876%.

Results: The purchase of €195.2 million of bonds was completed in December 2010. It is the world's first publicly rated bond issue for a solar project, as well as Italy's first rated project bond.

Source: Environmental Finance, 16.12.2010

As compensation for higher default risk, a lower rated bond would normally carry a higher interest rate than a higher rated bond. In this case, the situation is reversed. The higher rated bond pays the highest rate of interest to compensate the institutional investors for the cost of the guarantee fee they pay to SACE. The lower rate of interest accepted by the European Investment Bank is, obviously, a non-commercial price. The IDB, being a development institution, can include a rebate for positive external benefits in its pricing, which the institutional investors will not do. The higher rate of interest for the institutional investors can also be seen as including a risk premium for investing in a new asset class.

The Montalto di Castro solar farm bond issue satisfies the preference of institutional investors for direct investments in infrastructure assets; albeit in this case in bonds, not shares. The EIB's mode of intervention could, therefore, serve as a model for how the PSF's can assist the introduction and sales of low carbon bonds in client countries with a sufficiently large domestic financial sector. Being a new asset class, the first green bond issues on the market may fail to find sufficient off-take. The PSF's 'underwriting' facility can anticipate this situation by, similar to the EIB, serve as anchor investor for a significant share of the bonds. There would be an uninsured tranche for the PSF to invest in and a guaranteed tranche for institutional investors. The guarantee can be provided by a commercial guarantor or by a development bank. Most likely, also in this case, the institutional investors may need to get a 'return kicker' on the first bond issues, with the PSF-tranche accepting an interest rate below the commercial rate. The PSF will, in the following years, sell its bonds in the local market as confidence grows in the new asset class.

The institutional investors receive much attention in debates about the GCF. But considering the substantial household savings in Asian countries that are placed in low-interest yielding bank accounts, it may be easier to develop *a market for green retail bonds*. It would need massive advertisements, a first loss facility financed by the PSF to reassure investors of the safety of the assets, and the PSF as stand-by underwriter for the first bond issues, if no commercial bank is willing to take on the underwriting at an acceptable cost.

6.4.3 Securitisation of bank loans to expand end-user finance

Securitisation is the financing or refinancing of income yielding assets (in this case, bank loans) by packing them into a tradable form through an issue of securities. Typical investors in loans are mutual funds, exchange traded funds and "collateralised loan obligations (CLOs)", special purpose investment vehicles (SPVs) that finance the purchase of the assets by issuing bonds into the capital markets. In a 'true-sale' securitization, the seller (in this case a bank as originator of the income yielding debt) sells a pool of its assets (receivables generated in the course of its business; in this case repayments and payment of interest on

the loans) to an investor. The issued bonds are referred to as asset-backed securities because the purchased assets represent the principal source of cash to service the debt instruments.

Because junk household mortgages packed into securities were a main trigger of the financial crisis in 2007 asset-backed securities had temporarily fallen out of grace among investors. Yet, securitization allows financial institutions to diversify their funding sources and achieve economic and regulatory capital relief via credit risk transfer. The increased flexibility provided by the possibility to take small EE and RE loans off their books through securitisation, would increase the interest of banks to develop finance products for end-user investments in low carbon technologies and make it feasible for banks to extend the tenor of their loans to low carbon projects.

Developers are often non-investment grade or unrated companies. Securitization gives project developers access to long-term, low-cost financing, allowing them to improve their liquidity position and expand their businesses. The ability to tap into the securitization market therefore helps to expand the number of market participants who wish to invest in renewable energy. In the US, solar panel leasing companies have installed a significant share of the PV-systems on residential and non-residential buildings.¹⁰⁰ The solar panel leasing companies relied on equity funding and see securitizations as a way to monetize future cash flows and finance the expansion of their businesses.¹⁰¹

Thus, although securitization is not easy to introduce, in countries where there is a realistic chance of success, the option ought not be discarded by the PSF. It requires a large demand for loans (which inter alia could result from investments in roof-top PV-systems) and a reasonably well-developed national financial market. There are several ways for a PSF facility to enter.

One way is for the PSF to provide guarantees to senior and mezzanine tranches of risk in different forms: wraps, bilateral guarantees to noteholders, credit default swaps.

The other is in collaboration with MDBs and commercial banks to set up a 'structured' SPV to serve as aggregator for end-consumer investments in 'small-scale RE' and 'EE assets'; bundling together smaller green loans into funds sufficiently large and diversified to attract institutional investors. In this model, banks would perform their core function of originating loans to end-consumers. Once a critical mass is reached on a periodic basis, the banks would pool the loans together and transfer them to the SPV through a 'true sale' transfer. To avoid the moral hazard of banks pushing poor loans onto the SPV, the banks would have to retain equity in the secured loan portfolio equal to 5% of the value of sold assets to serve as a first loss piece. PSF could finance a second loss piece through a subordinated loan to the SPV. The two loss pieces together would provide low-risk bonds capable of achieving a high investment grade rating.

6.5 Supporting green share issues and professional asset investors

Once the volume of annual low-carbon investments in a country – or in a sub-region - has grown to a level that begins to strain the debt capacity of developers, then utility owners and developers of revenue generating low-carbon assets will seek new capital through sales of operating assets either fully or partially. It allows the current owners of such assets to reinvest the capital into new development programs to expand their

¹⁰⁰ Residential and commercial property owners enter into leases or power purchase agreements (PPAs) with solar developers. Under these agreements, the consumer receives solar electricity at below-retail rates and the project developer receives a predictable ongoing revenue stream.

¹⁰¹ Under the US tax credit support system to investments in distributed RE-systems - the developer also retains all state and local tax incentives associated with the solar system because ownership has not been transferred to the consumer.

portfolio. In India, one would expect that corporate investors who invested in utility scale PV-power plants for the purpose of obtaining the accelerated depreciation benefit, would be interested in selling their plants.

Once this stage is reached in a country – China and India are already there – it opens the possibility for establishment of long-term investment funds that invest in operating assets put up for sale but who also may co-invest in new projects from the construction phase. The infrastructure fund, described in the text box below, was set up by a subsidiary of the Irish power utility ESB with assistance from the Department for Business, Innovation and Skills. The fund has indefinite lifetime.

Share issue to finance the creation of an infrastructure fund: Greencoat UK Wind PLC

Type of infrastructure fund: closed-ended fund with an indefinite life; first listed investment fund on the London Stock Exchange aimed at UK renewables,

Investment objects: 100 per cent, majority or minority interests in individual windfarms owned by Special Purpose Vehicles (SPVs).

Fund raising target: £205-260 million; the latter was reached (over-subscribed!) late March 2013

Cornerstone Investors: The Department for Business, Innovation and Skills committed to subscribe for 50 million Ordinary Shares; SSE for up to 43 million Ordinary Shares (subject to priority scale back to not less than 10 million Ordinary Shares). Staff of investment manager to purchase 0.5 million shares.

Investment manager: Greencoat Capital LLP, established by Irish utility ESB

Company staff: The company will not employ staff

Pipeline of investments: The Company signed agreements to acquire a seed portfolio of interests in six wind farms comprising a net capacity of 126.5 MW. It was structured as agreement to acquire interests in four wind farms, totalling a net capacity of 102 MW, should the Company raise £205 million and an additional net capacity of 24.5 MW if the Company raised £260 million under the Issue.

Operator of windfarms: The day-to-day operations of the wind farm assets in the seed portfolio will continue to be performed by RWE and SSE, the current owner-operators of the windfarms.

Risk reduction investment policy: The Company will invest in onshore and offshore wind farms; the latter being capped at 40% of the Gross Asset Value. They will only invest in an offshore wind farm where a utility company retains an equity interest for a lock-up period.

Downside protection: Approximately half of the Company's revenues are expected to be derived from the Renewables Obligation Certificates for generating renewable energy.

Upside potential: The Company will retain exposure to UK power prices by entering into PPAs that do not fix the price of power sold over the long term.

Leverage: Debt capital will be used to co-finance the acquisition of investments and to preserve capital on a real basis. The total of short-term acquisition financing and long-term debt will be between zero and 40 per cent of Gross Asset Value of the Group at any time, with average total debt being 30 per cent in the longer term. Excess cashflow is to be reinvested by paying-down outstanding acquisition debt.

Shareholder returns: The Company aims to provide investors with a 6p dividend per Ordinary Share that increases in line with inflation. The capital value of its investment portfolio will be maintained on a real basis through reinvestment of excess cashflow and the prudent use of portfolio leverage

First investment jointly with Green Investment Bank: After the successful £260 million bond issue, Greencoat UK Wind PLC and Green Investment Bank, each acquired a 24.95% stake in the 90 MW Rhyl Flats off-shore wind farm; reportedly at a price of £57.5 million each.

Source: Greencoat Capital website + Renewable Energy Focus, 22 March 2013

It shows a model for how a fund based on collaboration between a power utility and a number of institutional investors could be structured with PSF assistance.

6.6 Assisting institutional investors in setting up infrastructure funds

Institutional investors prefer to invest directly in infrastructure assets rather than via private infrastructure funds; yet, most pension funds are too small to develop the specific expertise needed for direct investments in low-carbon projects and assets.¹⁰² An option is for small pension funds to create jointly owned ‘not for profit’ investment entities, which are managed to create profits for their institutional owners.

The *Pension Infrastructure Platform* concept for direct investments developed by a trio composed of the UK Treasury, the £11-billion Pension Protection Fund (PPF)¹⁰³ and the National Association of Pension Funds (NAPF)¹⁰⁴ can serve as example of the type of fund, which could be set up. It is summarized in the text box below. The initiative was driven by concern about the ability of pension funds to cover their pension obligations in a low return environment.

Pension Infrastructure Platform (PIP)

Legal status: The PIP is a not-for-profit company focused on providing returns to its investors.

Projected lifetime: 25-years

Investors: PIP has the backing of around 10 UK pension funds.

Investment target: Direct investments in infrastructure projects

Targeted investment volume: PIP will launch as a fund in January 2013, targeting £2 billion (\$3.2 billion) worth of projects.

Targeted return: The target return is the retail-price-index plus 2%–5% per annum over the projected 25-year life of the fund.

Fund management: The PIP may be run by staff seconded by the pension funds or by fund managers on management contracts.

Source: Various

The PSF can assist pension funds and the insurance industry in developing countries in setting up jointly owned climate investment funds using a combination of three instruments: (i) grant financed TA to prepare the concept, (ii) cost-sharing of the costs in setting up the fund and (iii) co-investing in the fund and through the associated membership on the board of the fund provide fund supervision and management expertise.

¹⁰² The complexity of modern finance is leading to a concentration of pension funds through mergers.

¹⁰³ PPF is protector of 12 million members. It pays out on schemes which employers fail to meet.

¹⁰⁴ NAPF counts 1200 pension funds as members, with a combined US\$1.3 trillion in assets.

7 Assisting the development of a national green supply chain

7.1 The PSF's strategic targets in green supply chain support

The 'green supply chain' comprises project developers and providers of products and services to investments in climate projects.

This report recommends that the Innovation Fund:

- at the **strategic-transformative level** be responsible for (i) assisting countries in establishing effective *public-private partnerships* for investments in mitigation and adaptation projects; (ii) facilitating the formation of productive *private-private partnerships* for investments in mitigation and adaptation projects, and (iii) advising Governments on initiatives likely to foster efficient *industry clusters*.
- in terms of **assistance to individual enterprises** focuses its support on three areas: (i) critical finance gaps of small-scale project developers; (ii) co-financing support to the development phase of innovative mitigation and adaptation projects that are proposed by high-tech companies and which have very promising transformative potential; (iii) business innovations by start-up companies in developing countries.

The NAPAs and NAMAs will include capacity-building projects to strengthen the capacity of agents in the adaptation and mitigation supply chains; capacity building is also an area many bilateral donors are active in. The Innovation Fund is, therefore, not expected to be much involved in *capacity building* except through incubation centers who support entrepreneurs with advise on business strategies and business administration.

If the Innovation Fund gets involved in support to *technology development*, it will most likely be in technologies for adaptation. The PSF instruments for this would be *inducement prizes* and *advanced market commitments*¹⁰⁵. But this area of intervention is not taken up in this report.

7.2 Assisting private-private and private-public partnerships

7.2.1 Private transaction advisors in relevant ministries

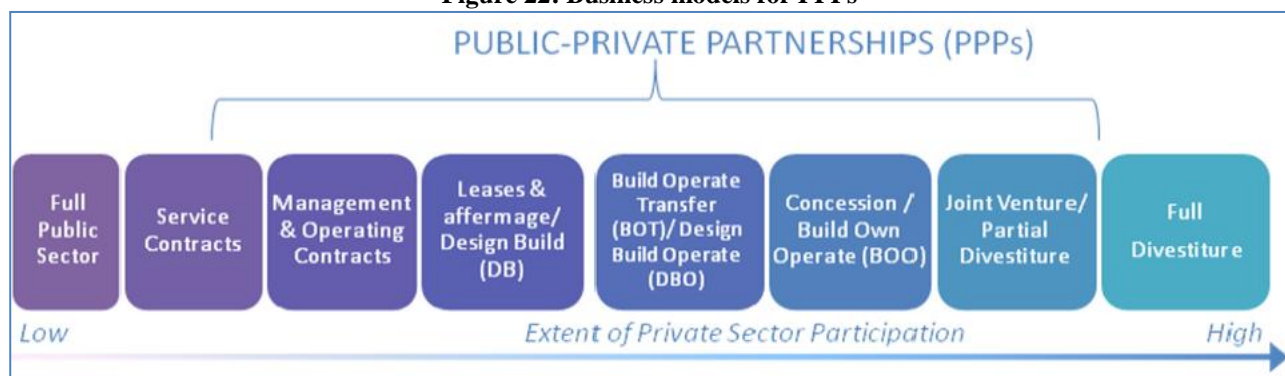
A low cost but high value investment by the PSF is to finance the cost of finance transaction advisors in one to three ministries having the oversight over the sectors where most of the private low-carbon investments take place. The transaction advisors serve two important purposes. One is to assist the senior administrative staff and the minister in reviewing and analyzing project proposals by private investors and in the negotiations with private investors. The other is to assist private investors with relevant information about regulations and policies in the country, which affect their project preparation and implementation process.

¹⁰⁵ An Advanced Market Commitment ensures investors in product development upfront of a minimum market demand and/or price for a product or service that meets certain specifications. E.g. in adaptation purchase guarantees for drought-resistant crops or water management technology.

7.2.2 Public Private Partnerships for investments in climate adaptation

In some technical literature, the term public-private-partnership (PPP) refers to contractual arrangements of the *PPP concession model* type¹⁰⁶; whereby part of the services or works that fall under the responsibilities of the public sector are provided by the private sector, with clear agreement on the objectives and the terms for delivery. In other literature, the term is used more broadly for *PPP alliances* where public and private parties work together in one way or the other on realizing projects that promote the achievement of specific policy goals. The figure below summarizes the most well-known forms for contractual arrangements.

Figure 22: Business models for PPPs



Source: Extract from Geraldine Ang and Virginie Marchal (2012)

The development of a low-carbon economy is a PPP undertaking. The government identifies priority projects for how the national economy can become more climate resilient, and facilitates their implementation through regulatory and public finance instruments. The private sector implements projects in response to the market opportunity offered by Government policy and its economic incentives. Due to the high viability gap of most adaptation projects, PPPs will be the dominant instrument for the implementation of private investments in adaptation projects.

Literature on adaptation projects distinguishes between investments addressing the vulnerability through economic adjustment and diversification and investments buffering against specific climate change impacts. Speaking in broad terms, the possibility for private co-finance is larger in the former than in the latter.

Examples of *economic adjustment and diversification projects* are: investments in drought and disease-resistant / stress-resilient crops – the seven-doubling of agro-forestry productivity achieved by the Clean Star project in Mozambique (see text box section 2.2) substantially increases the resilience of participating farmers to climate change - farmers' upgrade of irrigation systems, sustainable forest management and fisheries practices. These adaptation actions are initiated privately with some government prodding.

Examples of *investments in infrastructure, specifically dedicated to improving climate-resilience*, comprise: sea-walls, levees and barrages for flood protection; drainage systems designed for extreme rainfall, raised buildings, bridges and other structures capable of handling extreme heat or more frequent and extreme flooding; water capture and storage systems that will withstand drought and deal with increased water stress where this is exacerbated by climate change. These adaptation investments are typically large-scale and overwhelming initiated by Government.

¹⁰⁶ Concession type arrangements are Management & Operating Contracts; Leases / Affermage; Concessions / Build Operate Transfer / Design Build Operate; and Joint Ventures / Partial Divestitures of Public Assets.

In *transport*, experiences to date suggest that PPPs are particularly suited for bus rapid transit systems, specific rail and metro links, and shared-used bicycle systems.

Publicly initiated adaptation projects with private equity participation have typically a revenue stream in the form of user fees attached to them, e.g. water supply or waste management projects. However, in principle, most public benefit projects, having a fixed asset component, can be structured as PPPs, including purely protective investments such as sea walls. But it requires a PPP-contract, which includes credible annual/monthly leasing/service payments to be made from the public budget to the private investor/ service provider. Whereas the PPP can be structured with TA financed from the Innovation Fund, the credibility can be provided by ‘Adaptation’ either co-financing the annual payments to the private service provider or providing a guarantee for the public payments, thereby taking away the counterparty risk. To engage in that, the PS may require the passing of a law which, on a long term basis, ring-fences the revenues from specific taxes to pay for adaptation services provided by guaranteed PPP-contracts.

The pros and cons of upfront private investments in public infrastructure depend on the specific situation in the country, not the least for ability of the public sector to borrow capital for investments. The experiences of the UK’s Private Finance Initiative (PFI) have caused some controversy. The PFI financed e.g. the construction of new or major renovations of existing public buildings though 30 years service contracts after which the property returned free of charge into public hands. It was propagated as a means to allow private innovation and supposedly superior construction cost control to deliver public services at a lower cost than public investors, despite the cost advantage of the public sector in securing debt at a lower cost than private borrowers. Yet, the evidence in practice did not reveal cost savings. Therefore, it is better conservatively to argue for such PPAs by referring to the acceleration of public investment and the enjoyment of associated services a few years earlier.

7.2.3 Promotion of private-private partnerships

Promotion of *private-private partnerships* can help speed up the process of transformation and lower its costs, particularly during the early stages towards a climate-resilient and low-carbon economy.

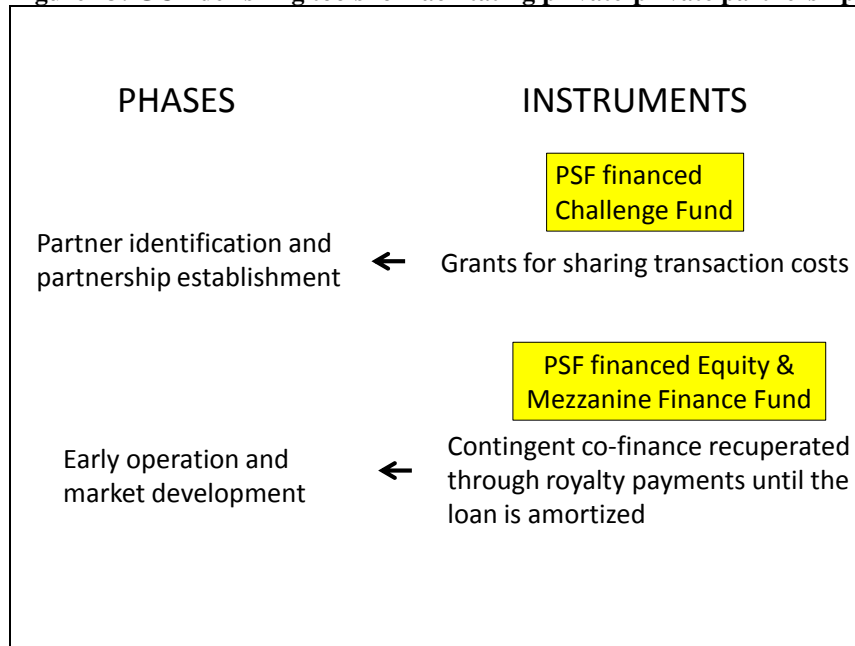
Getting a partnership established is a negotiation heavy process with high transaction costs in manpower use and external legal and consultant fees. In the off-shore windfarm case summarized in Annex III, the large scale of the investment provided the incentive for getting the partnerships established without public financial assistance; the future annual profits from the project enable a fast recuperation of initial transaction costs. In many GCF client countries, the market for specific types of climate investments is smaller and the regulatory environment more uncertain. In this context, the transaction costs represent a bigger barrier for establishing partnerships.

The *PSF* can reduce the barrier by sharing the transaction costs for getting a private-private partnership established, which has strategic value for national climate policy. The supported partnerships can be ‘South-South’, ‘North-South’ or ‘intra Southern country’. The tools for the PSF’s engagement are summarized in figure 23 below.

- A ‘Challenge Fund for Private-Private Collaboration’ to cost-share in the initial development of proposals for innovative partnership projects with promising transformative impacts and replication potential in other countries.
- In relevant cases, e.g. the case of a strategic partnership marketing climate resilient agricultural technology to farmers, a separate PSF ‘Mezzanine Finance’ facility could provide follow-up support

in the form of a mezzanine loan (contingent finance loan) to co-finance investments in early market development, once the partnership is established.

Figure 23: GCF derisking tools for facilitating private-private partnerships



Source: Author

7.2.4 Assisting the development of industry clusters

The ultimate criterion for the successful implementation of a ‘green growth’ strategy is the establishment of green *industry clusters*. An industry cluster (also called “business cluster”) is a geographic concentration of interconnected businesses, suppliers, and associated institutions in a particular field: primary producers, manufacturers, subcontractors and service systems.¹⁰⁷ The businesses depend on the same policy framework and are mutually dependent in supplying a group of products to a specific market. An example is an “energy-efficient housing” cluster composed of: university research in energy efficient housing, energy-efficient architects and engineers, manufacturers of insulation materials, of energy-efficient glass and windows frames, of energy-efficient light bulbs, of energy efficient ventilation, heating and cooling systems, construction firms specialized in energy-efficient construction and their workers, electricians, etc. All depend on Government policies and regulations in favor of efficient housing. Between them, substantial exchanges of experiences take place at horizontal levels (e.g. exchange of lessons learned between foremen of construction companies) and at vertical levels (actors at different levels in a supply chain giving feedbacks to each other about how a product can be improved). Due to interactions, clusters improve the international competitiveness of an industry by: (i) increasing the productivity of the companies in the cluster, (ii) driving innovation in the field and (iii) stimulating the creation of new businesses in the field.¹⁰⁸

¹⁰⁷ Cluster analysis was, above all, developed by Michael Porter in collaboration with researchers from several countries in his “Competitive Advantage of Nations” from 1992.

¹⁰⁸ California’s Silicon Valley has more high-tech upstart companies than any other place in the world and more venture capital firms than any other place. High-tech companies are founded there because of easy access to venture capital, and venture capital firms are there because of the high number of high-tech upstarts.

Cluster initiatives are programs that are organized as collaborations between a diverse number of public and private sector actors, such as firms, government agencies, and academic institutions. Cluster initiatives are involved in a broad range of activities, e.g. supply-chain development, market intelligence, incubator services, attraction of foreign direct investment, management training, joint R&D projects, marketing of the region, setting technical standards and lobbying policymakers.

It is impossible for the GCF/PSF to engage in cluster initiatives; it is an area for industrial policies initiated by governments. Even for Government programs, the creation of clusters is almost beyond reach. What the PSF can do is to strengthen the ability of individual actors in the green supply chain to operate efficiently and effectively. High quality may then sow the seeds for national clusters and private-public partnerships.

7.3 Assisting small-scale project developers

This report recommends that the Innovation Fund establishes a sub-fund specializing in support to small to medium scale project developers in bringing planned projects to a successful conclusion. It cannot be envisaged a priori which finance instrument the sub-fund will apply mostly – that depends on the individual countries and on how the private fund situation develops. But it is likely that the instruments of the sub-fund will comprise contingent project development grants and investments in project development companies. But the possibility cannot be excluded of investments in private equity funds which specialize in project development in frontier countries.¹⁰⁹

7.3.1 Contingent project development grants

A contingent grant, which transforms to a loan if the project is successful, allows development activities to proceed without the developer taking on loans that they may default on if the project cannot be implemented for reasons outside her/his control. Contingent grants finance project development costs on a cost-shared basis, typically covering no more than 50 percent of estimated project development costs. To avoid over-invoicing, many schemes award contingent grants as fixed amounts and not by reimbursing an agreed percentage of project costs. The contingent grant addresses two barriers. One is the shortfall of finance for project preparation and development. The other is risk sharing; uncertain country environments make private developers reluctant to take on the development risk fully on their own; resource risks are particularly high in geothermal power projects, environmental risks can block hydropower and the NIMBY-effect windfarms projects.

Some assistance programs apply a different philosophy: providing development support as a loan, which converts to a grant if the project is successfully implemented. The stated philosophy for the approach is that it creates incentives for the developer to pursue rapid implementation of the project. To a certain extent the argument has logic: some project developers are interested not in the construction stage of a project but in selling the project rights for a project; they may delay project implementation waiting for better prices. Yet, the modality cannot be recommended as the risk sharing is too awkward: there is no upside for public finance participation in case of success, and a double financial whammy for the investor if he fails!

¹⁰⁹ “High risk, first loss capital is needed for the growth of companies that provide clean technology products and services. The GCF should have some funding to provide equity, subordinated or mezzanine debt, and act as a fund of funds for developing country clean technology private equity funds, particularly those that focus on SMEs.” Source: IDB Submission to the Transitional Committee: “Private Sector Views on the Green Climate Fund and International Climate Finance from Latin America and the Caribbean”, 2011

7.3.2 Project development company

Whereas the contingent grant facility addresses a problem of lack of risk capital for small project developers, the project development and equity fund approach addresses the problem of lack of well-qualified developers. Infrastructure fund managers complain that project proposals submitted to them are of too low quality. This weakness can be reduced by appropriate *capacity building programs for local developers*.

The *project development company* approach tackles this problem directly by investing in project development up to the full feasibility stage. At this stage, the project is sold to other investors who proceed with the construction and later operation of the plant.

The *private equity* fund approach works with small and medium scale project developers providing them with risk finance, with good project preparation and management advice and with assistance in putting together the full financing package for the project. The Private Infrastructure Development Group (PIDG)¹¹⁰ has set up two funds, co-financed by ADB, to assist project developers in the early project preparation stages, where risks are highest and the chances of getting debt finance are close to zero. InfraCo Asia, part of the InfraCo Group funded by ADB, has invested US\$20 million in InfraCo Asia Development Pte. a private sector infrastructure development company. By acting as a principal project developer, InfraCo Asia aims to stimulate greater private investment in infrastructure development in low-income countries of South and Southeast Asia. InfraCo Asia focuses on smaller-scale projects (up to US\$75m). InfraCo Asia aims to reduce the entry costs of private sector infrastructure developers by acting as principal, taking an equity stake in the project to shoulder the risks of early stage development costs and providing development expertise through its team of experienced developers. InfraCo Asia also arranges project debt and equity capital from third parties, as well as other InfraCo affiliate programmes. InfraCo Asia retains an equity stake in the projects it develops to provide market confidence through the early operating period.

7.4 Covering gaps in development finance: business innovations

7.4.1 Scope of development finance

The term *development finance* refers to investments in new technology and service companies and in new products from existing companies. Compared to *asset finance*, development finance has a higher reliance on equity and quasi-equity/mezzanine forms of finance as higher risks and low collateral make it difficult to engage debt capital.

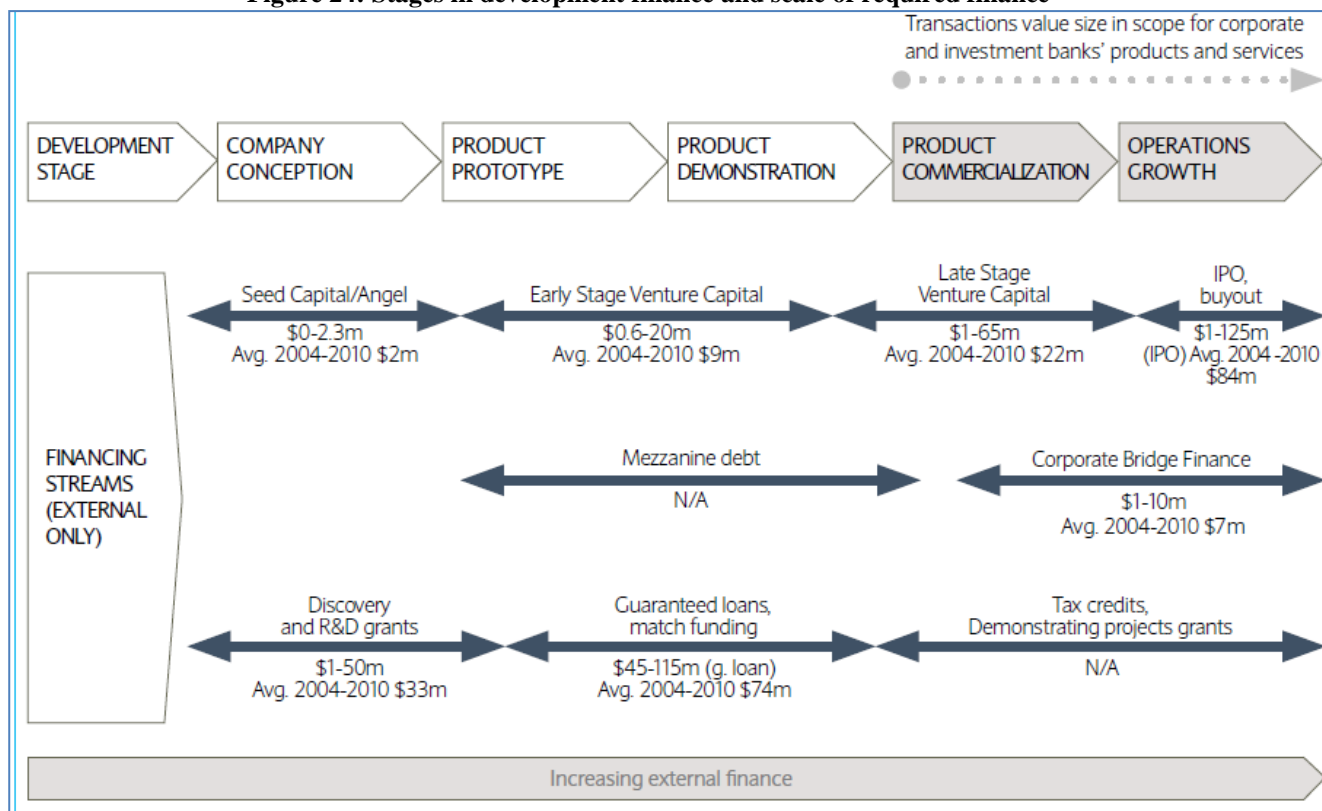
Figure 24 below summarizes the different phases in a development chain – development stage, company conception stage, product prototype, product demonstration – and the follow-up commercialization and growth stages. This report recommends the PSF's Innovation Fund:

- to focus its primary attention on the first two stages - the *development stage* and the *company conception stage* - where the capital requirements are lowest, but the risks are highest;
- support to *established larger scale firms* is to be limited to cost-sharing in the development phase and to the testing of innovative business concepts, not to technology development;

¹¹⁰ Members of PIDG include the World Bank Group, KfW and the development agencies of Austria, Ireland, the Netherlands, Sweden, Switzerland and the UK.

- *start-up SMEs in developing countries* with innovative business concepts are to receive cost-sharing support to the company conception stage also; cost-sharing may also include support to initial technology development.

Figure 24: Stages in development finance and scale of required finance



Source: Accenture & Barclays (2011)

7.4.2 How will the PSF define “innovation”?

The term “innovation” requires an operational definition to decide eligibility for support. Innovations by firms in the promotion of new climate technology take place in three areas:

- product innovation,
- process innovation, and
- marketing and end-consumer finance innovations.

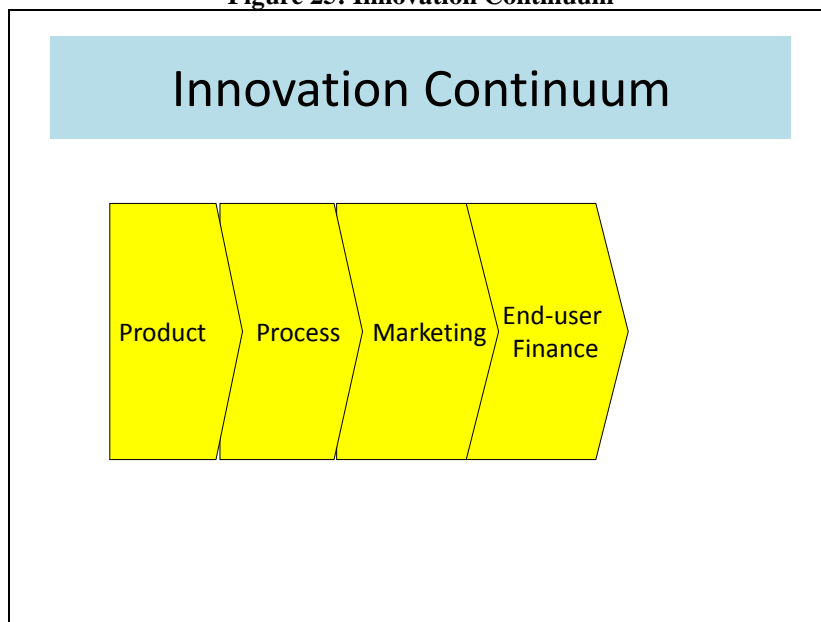
A firm involved in product innovation will be involved later in process innovation (at least in the sense of establishing a new production line) and in commercial innovation. The innovation stages summarized in figure 25, represent a continuum.¹¹¹

In line with the recommendation for the Innovation Fund to focus on the testing of innovative business concepts, this report recommends that

¹¹¹ An example from improved stove programs: improved charcoal stove producers in Ghana and Mali were involved in product innovation (adjusted versions of the Kenyan Jiko model), in process innovation (reducing the failure rate in the kiln-production of the ceramic ring for the stove took a long period of trial and error) and commercial innovations (using satisfied housewife customers to market the stoves).

- ‘product’ for eligibility is understood as new project concepts, where proven technologies are combined in new innovative ways;
- ‘process’ is interpreted as the building of supply chains not as in-house manufacturing technology;
- ‘marketing’ and ‘end-user finance’ support is for innovative, replicable concepts only.

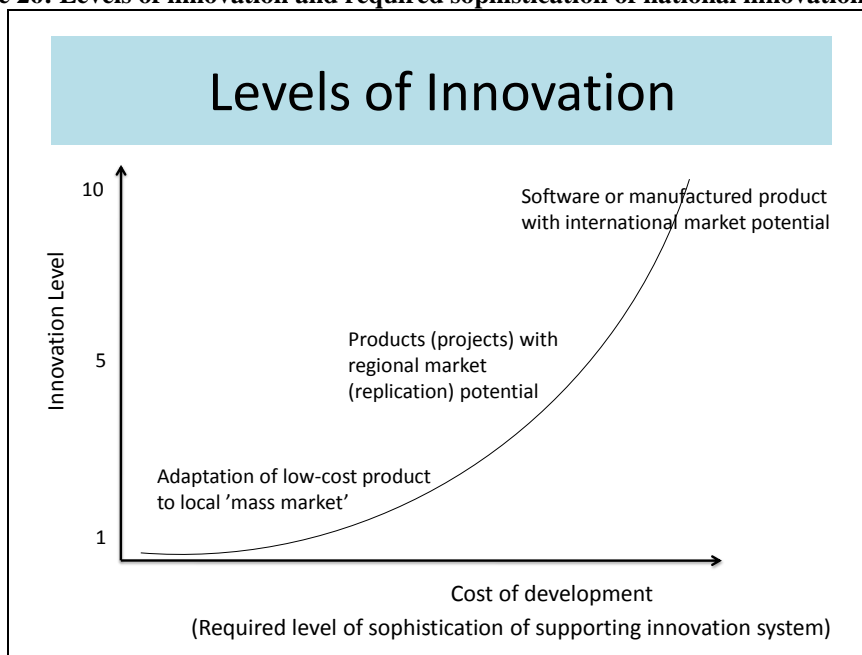
Figure 25: Innovation Continuum



Source: Author

The eligibility criteria for an Innovation Fund must define realistic innovation levels for support, see figure 26.

Figure 26: Levels of innovation and required sophistication of national innovation system



Source: Author

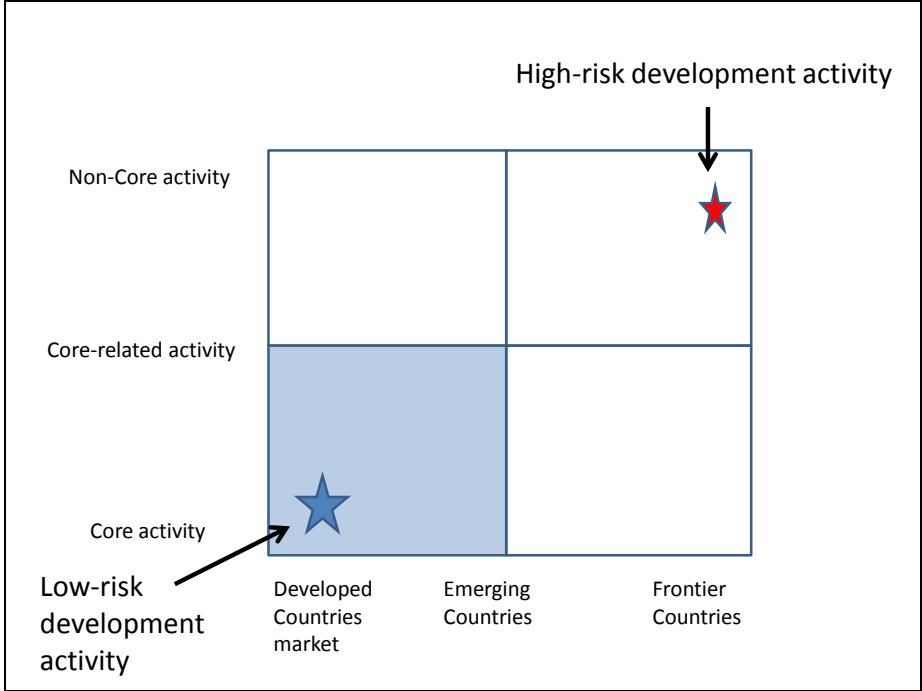
If the eligibility level is set too low, the fund will receive too many applications (leading to high transaction costs); if the minimum innovation threshold is set too high, the fund will receive too few applications to disburse its funds. However the Fund can accommodate a highly ambitious innovation requirement by including a broad range of projects (adaptation and mitigation across sectors) in the eligibility definition and organising cross-national tenders.

7.4.3 Seed capital to assist business innovations by high-tech firms

This report recommends the PSF’s Innovation Funds to set up an ‘Innovation Support Facility for Non-Core Climate Projects by established High-Tech Firms’. A PSF facility, co-financing early stage development of potentially transformational projects, can make a real difference in getting projects started that otherwise would have been blocked by the finance officers in established international and national corporations.

The Facility would accept proposals from international firms as well as national firms in a developing country. For the PSF to give assistance to established international firms is controversial. Yet, first of all, for the transformation objectives of the GCF, cooperation with strong established players is essential. It enables technology transfer and implementing complex projects requiring high organizational capacity and a network of international contacts. The Clean Star project in Mozambique represents an example of a high-value project which can be put together only by an established high-tech firm. It took less than four years to have it in full operation from the time the first very vague idea was formulated till the products were sold to consumers in major Mozambique cities. Yet, it was very hard for the idea originator to get seed funding for the development of his idea approved from the finance officer: being a non-core activity for the firm as well as a high risk project, see figure 28, was an almost un-surmountable hurdle.

Figure 27: Risk of commercial company investment in a non-core development project



Source: Author, strongly inspired by a presentation by Stefan Maard, Novozymes

The Clean Star experience illustrates the justification for providing seed-capital support to high-tech companies for the development of transformative adaptation and mitigation projects that fall clearly outside

their core-activity. The objective is to encourage entrepreneur units in these firms to think of developing climate project concepts. The ability to secure seed-funding will enable these to pass internal company approval hurdles both because of the reduced initial funding costs for the company (less internal fund competition) and because cost-funding accept by the Fund is a stamp of approval for the realism of the project proposal.

The required sums are small – US\$300,000 to 600,000 will make a real difference – and can be given as contingent grants, to be repaid if the project idea is realized and becomes a commercial success.

It is an open question whether such Innovation Funds can operate only as Challenge Funds – organizing periodic calls for project proposals – or whether as response facility is feasible, using a website based questionnaire to filter away unrealistic requests for support.

7.4.4 Incubation services for start ups in frontier countries

A number of organizations, including the IFC, have set up incubation centers for start-up SMEs.

This report recommends the Innovation Fund to set up a facility providing support to the preparation of feasibility studies for incubation centers and for the initial start-up of centers for which the demand was confirmed by their feasibility study.

7.4.5 ESCOs – business innovations in EE

ESCOs come in various varieties. The most important distinction concerns the degree of ESCO-own finance of identified investments and the level of performance guarantees. Another one concerns ownership: public versus private, utility-based ESCOs as an element of a DSM or financing program, etc. EBRD was involved in four attempts at creating ESCOs, three of which were framework agreements – blanket approval by the EBRD Board to invest in individual projects – with equipment manufacturers.

Performance of ESCOs has generally not been very successful. The absence of well-developed public demand for EE-investments was and is one important implementation hurdle for ESCOs, the other was lack of legal and financial infrastructure to adapt to and support such business models. Hurdles on the financing side included lack of access to ESCO project financing, and lack of equity sources for new ESCOs (particularly when offering off-balance sheet financing). At industry level, hurdles included inability for staff of new ESCOs to sufficiently identify, mitigate and manage risks, weak business and sales skills among ESCO staff and legal and taxation issues associated with the ESCO business.

However, some success stories exist. UKRESKO, a state owned ESCO in Ukraine worked well; not as a fully-fledged ESCO but as an industrial EE consultancy company able to provide debt finance to its clients. Enemonia in Bulgaria is a private company supported by EBRD-finance, and BEEF has ESCO-characteristics.

Although the experience shows the difficulties of starting up ESCOs in a weak regulatory-policy context, the conceptual case for ESCOs as an instrument in EE-programs remains valid. The potential ability of ESCOs as integrator of EE projects, each individually too small to pass the minimum investment size hurdle of equity funds, and bundling the procurement of goods across several projects into one demand for external funding is a key theme of the original project document for the FEEI project.

Therefore, this report recommends the establishment of an ESCO-support facility.

7.5 Insurance and guarantee products

Insurance and guarantee facilities have so many useful applications in promoting private investments in climate projects that it is difficult to envisage that the PSF would not apply these as well. Yet, the question is in what form, in which countries and in support of which products?

Used in their most straightforward manner as instruments to reduce the risk of conventional debt, subordinated debt, publicly backed guarantees (PBGs), and first loss reserves have very similar impacts on risk reduction. First loss reserves make sense for portfolio finance; subordinated debt and publicly backed guarantees can also be used for individual project finance.

Private insurance and guarantee companies and public-private funds offer risk cover on commercial terms to RE projects in emerging and developing economies. Thus, the availability on international markets of appropriate insurance and guarantee products should be determined before putting in place a specific risk product as part of a public finance program. Purchasing commercial risk products with program funds will be more cost effective. The PSF can either:

- (i) introduce insurance and/or guarantee products of its own, or
- (ii) invest equity capital in existing facilities providing such products; or
- (iii) subsidise the price in selected countries of insurance and guarantee products which are either new and untested on the market or protect low-income populations that are vulnerable to risk exposure (as they are in most informal settlements) and whose capacity to pay low; or
- (iv) provide first-loss protection to insurance and guarantee providers to the introduction of new insurance and guarantee products on a national market.

Political risk insurance

Political risk insurance, for example, could be a PSF product, because the PSF is present in all developing countries (meaning it has the necessary scale and scope to introduce a product) and has high political clout (meaning it will be cost-effective because . Quite a few facilities already help attracting private financing in infrastructure projects located in LDCs by covering losses as a result of expropriation, political instability, currency risk and breach of contract. However, the instruments have room for improvement. Expropriation coverage instruments offered by the Multilateral Investment Guarantee and Overseas Private Investment Corporation (OPIC) only provide partial coverage: Significant uncertainties limit how much they have been used, and have made credit rating agencies reluctant to fully acknowledge their effectiveness in enhancing projects' credit ratings. A new instrument offered by OPIC, a feed-in-tariff insurance product, fills some of these gaps by providing direct policy risk coverage in developing countries.

Counterparty risk

Counterparty risk arises from reliance on construction companies, suppliers, operators, concession awarders (providing Fit-premiums through policy) and on output off-takers (utility's compliance with terms of PPA). The first three are commercial risks for which commercial risk mitigation instruments are available. Thus, the PSF is to concentrate on the latter, on utility and on (climate) policy risk insurance, where it has a comparative advantage compared to commercial insurance companies. Because the GCF is an international institution with a long lifetime and a provider of grants and concessional finance in addition to finance on commercial terms, falling out of favor with the GCF is bound to have negative financial consequences for a country. This reduces the risk of moral hazard impacts when a PSF-supported facility issues a policy risk insurance.

Export credit agencies and a number of development finance institutions, in particular MIGA, offer already political risk insurance. Yet, there are gaps in coverage. This provides a gap filling role for the PSF.

In many ADB client countries, RE-project developers face a significant counterparty risk: that either the utility or Government will not honor the continued payment of a feed-in-premium during the full PPA period. Within the division of financing responsibilities between donors, the GCF would be the best suited organization to provide a *guarantee facility* or a *PPA breach of contract insurance* instrument. Having GCF providing the facility reduces the risk of moral hazard on the host government side: because GCF is an international organization with a long lifetime, governments will be very hesitant to impose default losses on the GCF, as this would have negative repercussions on the country's ability to receive further grant finance from the GCF.

Multi-year energy yield insurance product

A number of commercial insurers have begun offering multi-year energy yield risk cover and insurance against extreme weather events. The insurance secures smooth cash-flows for senior lenders during the - operating phase, which is hit by energy yield variability and poor availability arising from extreme or unusual weather events. This reduces the risk for local finance providers. But as these insurance products may be available for selected markets and technologies only, there may be a valuable role for the PSF as underwriter of multi-year weather insurance products in underserved categories of markets.

Currency exchange hedging

Currency hedging is used to promote long-term local currency financing for borrowers in developing countries that do not have hard currency income. This report does not expect the PSF to get involved in hedging the currency mismatch incurred when an international investor provides a long-term loan to a borrower in a developing country. In such a situation, the international lender requires an amortization in hard currency, whilst the domestic borrower wants a local currency obligation. Promoting North-South finance flows is, of course, a mandate of the GCF. But, two special purpose funds exist already providing market risk management products to investors active in emerging markets, and focusing on currencies and maturities which are not covered by regular market providers.

The Currency Exchange Fund (TCX) trades the currencies of all OECD DAC 2006 countries and offers hedging of these currencies into any tradeable currency through foreign exchange forwards, forward rate agreements, foreign exchange swaps, cross currency swaps, interest rate swaps, forward starting swaps. In Asia TCX provides deliverable products in Indonesia, Mongolia, Philippines, Vietnam. The TCX is a multilateral instrument that can be used as a model to be scaled up. TCX is structured to help its investors to hedge exchange and interest rate risks associated with long-term investing in developing country currencies. These risks are transferred to TCX by means of medium to long-term swap agreements. TCX pools market risk from multiple investors with diversified geographical business. The resulting global diversification leads to a significant risk reduction and economies of scale and scope. Through this diversification across multiple currencies, TCX can provide hedging products for currencies at a lower cost than what can currently be achieved otherwise. TCX consists of a swap portfolio that is naturally long emerging market currencies and short USD.

GuarantCo guarantees local currency loans and bonds for the private, municipal and parastatal infrastructure sectors in low income countries. It operates under the Private Infrastructure Development Group, a coalition of donors mobilising private sector investment to assist developing countries to provide infrastructure vital to boost their economic development and combat poverty.

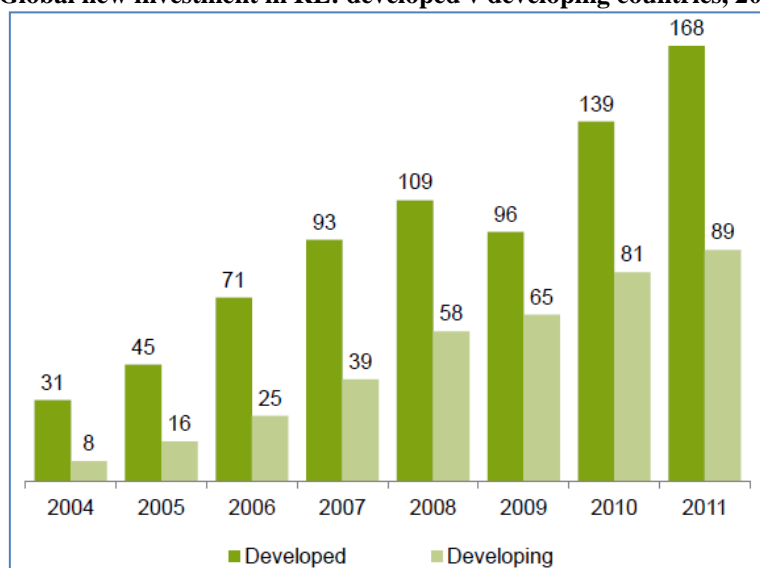
Annexes

Annex I: Investments in RE, EE and adaptation in 2010

Investments in renewable energy

Global investment in renewable power and fuels increased 17% to a record of US\$ 257 billion in 2011.¹¹² Developing economies accounted for 35% of the total. China's US\$ 52 billion in new investments were the highest of any country in 2011. China accounted for nearly 60% of the total new investments in developing countries and more than 20% of the global total.

Figure 28: Global new investment in RE: developed v developing countries, 2004-2011, \$bn



Source: Frankfurt School/UNEP (2012)

Solar power dominated in technology-specific investments attracting US\$ 147 billion in investments, wind farm projects US\$ 84 billion, biomass and waste-to-energy technology US\$ 11 billion. Small hydro attracted US\$ 6 billion, biofuels US\$ 3 billion, geothermal installations US\$ 2.9 billion, marine energy technologies US\$ 0.2 billion.

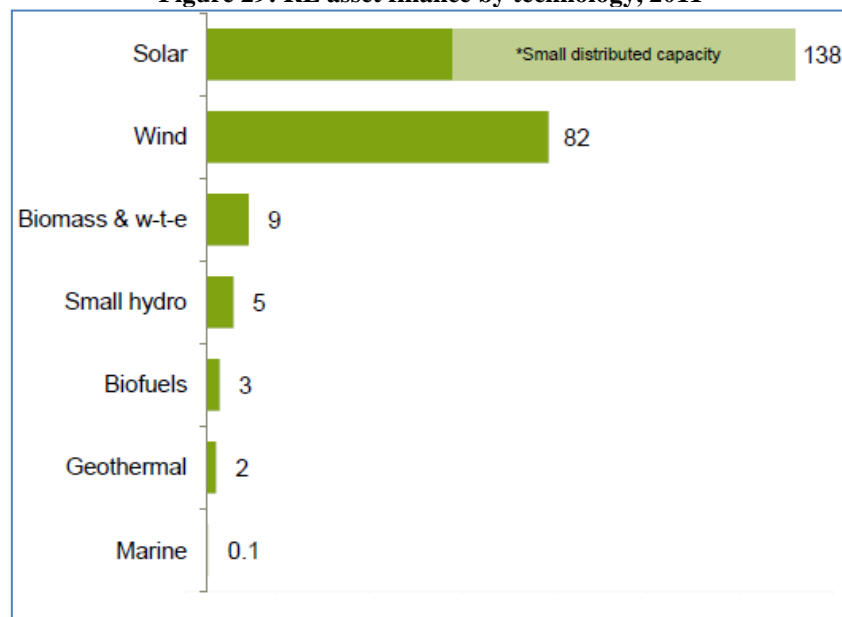
Due to the success of roof-top PV-systems in Germany and Italy, investments in small-scale distributed power capacity” reached US\$ 76 billion in 2011. 99% of the investment took place in developed countries versus 1% in developing countries. 67% of the finance came from corporate actors, 30% from households and 3% from domestic public budget (schools, army, etc.).

For the US\$10 billion invested in *solar water heaters*, the geographic situation is the reverse. 87% of the investment took place in the developing countries with China being the totally dominant investor versus 13% in the developed countries. 91% of the investment came from households, 6% from the domestic public budget (schools, army, etc.) while corporate actors provided 4%.¹¹³ As the installed cost of solar PV panels goes further down, one can, therefore, safely forecast a huge increase in small scale distributed power generation in the developing world within a few years.

¹¹² Unless stated otherwise, the source for the figures in this section is: Frankfurt School – UNEP: “Global Trends in Renewable Energy Investment”, 2012

¹¹³ Franz Mauthner & Werner Weiss: “Solar water heat worldwide. Market and contributions 2010”, 2012

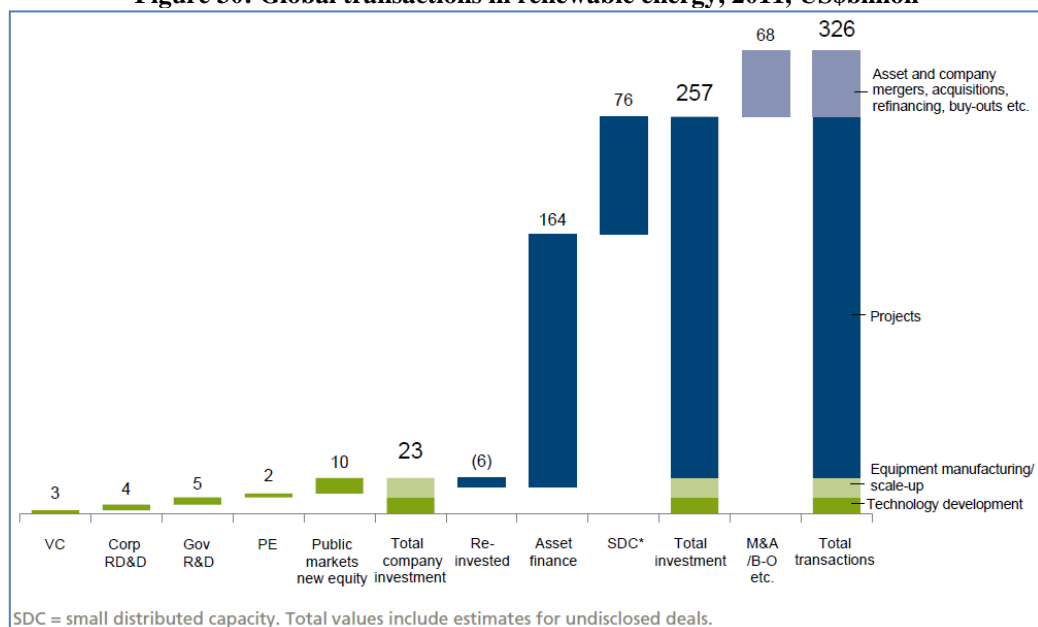
Figure 29: RE asset finance by technology, 2011



Source: Frankfurt School/UNEP (2012)

The chart below informs about the composition of the financial investments in renewable energy according to the three categories of “technology company finance”, “project finance” and “financial transactions in mergers & acquisitions, etc”. Unsurprisingly, asset finance dominates. In order to underline the difference between stand-alone and end-user assets, the chart distinguishes between “asset finance” and “small distributed capacity”.

Figure 30: Global transactions in renewable energy, 2011, US\$billion



Source: Frankfurt School/UNEP (2012)

In 2011, *subsidies to renewable energy systems* reached US\$ 88 billion, an increase of 24% compared to 2010. The IEA forecasts subsidies to rise to nearly US\$ 240 billion in 2035; about US\$ 180 billion for electricity and the remainder for biofuels.¹¹⁴

Global investment in energy efficiency

The IEA estimates the total global investment in 2011 in energy efficiency measures at US\$ 180 billion.¹¹⁵ Approximately one third is spent in non-OECD countries; the five BRICS countries account for US\$ 44 billion. The breakdown by BRICS-country is shown in the table below.

Table 5: Energy efficiency investments in BRICS countries in 2011

| Table 1 • Estimation of energy efficiency investments in BRICS countries in 2011 (USD million) | | |
|--|--------------------------------|----------------------------------|
| Country | EE investments 2011 (millions) | MDBs' EE funding 2011 (millions) |
| China | 28 400 | 650 |
| India ⁹ | 9 500 | 200 |
| Russia | 4 134 | 430 |
| Brazil | 1 100* | 7 |
| South Africa | 570* | 40 |
| Total | 43 704 | 1 327 |
| Source : IEA analysis | | |
| Notes: * = authors' estimations using leverage ratios of 2 and 3 for public and MDB funding respectively | | |

Source: IEA: "Plugging the Energy Efficiency Gap with Climate Finance", 2012

Two thirds of the BRICS investment was undertaken by China, which during the 11th Five Year Plan (2006-2010) invested around US\$ 142 billion in improved energy efficiency. 15% of the finance came from central and local governments, the rest came from private companies - commercial banks, energy-providers, host enterprises or ESCOs - most of them state-owned.¹¹⁶ Compared to the yearly average of EE investments in China of US\$ 28 billion, the US\$ 0.6 billion provided by multinational DFIs to EE-investments in China in 2011 is tiny. Chinese planners use multinational development finance strategically to transfer know-how and innovative practices to China.

Investment in clean technology companies

Global clean technology venture and corporate investments totaled US\$ 9 billion in 2011; Asian companies raised US\$ 879 million in 71 disclosed rounds.¹¹⁷ Solar was the leading sector *in venture capital and private equity provision* of renewable energy, with US\$ 2.4 billion.

In the *public markets* (stock exchanges), the 51 clean-tech initial public offerings (IPO) raised US\$ 9.6 billion: US\$ 4.5 billion for wind, US\$ 4.2 billion for solar; biofuels obtained US\$ 654 million and geothermal US\$ 406 million. 28 IPOs were in China; the largest was for Sinohydro, a Chinese state-owned hydropower company, which raised US\$ 2.12 billion on the Shanghai Stock Exchange.

¹¹⁴ For comparative purposes: subsidies to fossil fuels amounted to \$523 billion in 2011. Source: IEA WEO2012

¹¹⁵ IEA: "Plugging the Energy Efficiency Gap with Climate Finance", 2012

¹¹⁶ Source: CPI (2012)

¹¹⁷ The information in this section stems from newsletters by Cleantech Group LLC

Global clean-tech mergers and acquisitions reached record highs in 2011 with 391 deals and a dollar volume of US\$ 41.2 billion.

Investment in adaptation and mitigation investment in forestry and land management

No reliable information is available at present on global investments in adaptation. Nor is there agreement on the definition of what types of investments can be classified as *adaptation investment*.

The Climate Policy Initiative (CPI) in its Landscape 2012 report provides an estimate of US\$16 billion. Because of the difficulty in getting data on adaptation investments, the CPI's investment estimate is likely on the low side.

CPI estimates present global mitigation investments in *sustainable forestry and land management* practices at US\$ 39 billion per year.

The UNFCCC secretariat estimates that the required additional investment in adaptation amounts to US\$ 60–182 billion in 2030, some US\$ 28–67 billion of which are needed in developing countries. The largest uncertainty in these estimates is in the cost of adapting infrastructure to make it more climate resilient. It may require anything between US\$ 8–130 billion in 2030, one-third of which would be in developing countries.¹¹⁸

WEF (2013) estimates the additional investment requirements beyond current spending for adaptation at US\$ 100 billion per year.

¹¹⁸ Source: Finance adaptation to climate change. Issues and priorities

Annex II: Recommendations from workshops and papers for the GCF's private sector engagement

Venues for GCF's private sector engagement

The principal venues for engaging the private sector by the Green Climate Fund (GCF) were summarized by the Work Stream III facilitators at a workshop organized by the Preliminary Committee under the UNFCCC in Geneva.¹¹⁹

1. One is *private sector investment into the GCF at the Fund level*.
2. Another is *private sector investment into GCF supported programs and projects*.
3. A third is for the *private sector as service providers and contractors*,
4. A fourth is for the *private sector as carbon investors*.

For each venue, the facilitators listed a number of options for what the GCF could do.

Recommendations specifically for the GCF's private sector engagement in general

Support regional or global level activities and CSOs

The GEF underlined two lessons from its experience.¹²⁰

One was the value-added provided by GEF in addressing regional and global issues in encouraging partnership between many countries, leading to the recommendation that at least 20-25% of GCF's resources be allocated to support regional or global level activities.

The other was that the GEF's co-financing of Civil Service Organisation (CSO) projects was assessed as being one of GEFs most successful programs and that a dedicated CSO financing window is critical to ensure that CSOs don't have to compete with governments for resources. Whereas the recommendation to set up a specific CSO funding window is unlikely to be followed, the promotion of CSOs could be an interesting side-activity for the PSF.

Support SME's and project developers

A discussion workshop with project developers in East Africa provided points of views from the service and technology industry in 'Southern countries'.¹²¹ Participants spoke of missed investment opportunities due to lack of expertise in translating the large number of creative project ideas and concepts into a 'bankable project pipeline' fulfilling the requirements of commercial banks. A significant part of the potential in addressing climate change in many countries in Africa can be realized only via larger numbers of small- and medium scale projects; yet, financing SMEs and access to even smaller loans/financing was difficult. Lack of equity capital or risk capital posed a major problem for the financing for clean energy projects: A higher

¹¹⁹ Work Stream III co-facilitators Mr. Ewen McDonald, Mr. Farrukh Khan: "Leveraging the Private Sector. Introductory remarks", Geneva, 11 Sept 2011.

¹²⁰ "Building Blocks for the Green Climate Fund. Experiences from GEF". Presentation at the Workshop on Lessons Learned from Relevant Funds and Institutions for the Design of the Green Climate Fund July 12, 2011 Tokyo, Japan

¹²¹ Jan G. Andreas and Ulf Moslener: "Workshop Report. Regional Private Sector Consultation. Supporting the Work of the Transitional Committee for the Design of the Green Climate Fund", 25 August 2011 Frankfurt School, Risoe Collaborating Centre

proportion of equity capital in a project means that less bank loans are necessary to finance the project. The higher the buffer provided by equity (first loss protection) the higher is the likelihood that the bank will get all its money back. Participants recommended financial support to SMEs providing services and technologies for EE or RE and to projects in the agricultural sector. The latter also had adaptation aspects.

Assist the financial sector with risk mitigation and tenor extension

The same emphasis on instruments for improving the conditions for local investors can be seen in recommendations made by the finance community.¹²² They include providing support for:

- risk mitigation, sharing and absorption mechanisms, e.g. guarantees on low carbon technology performance, securing off take arrangements, and infrastructure adaptation premiums;
- national and regional institutions to extend the duration of their capital market issuances and crowd in institutional investors;
- private sector FIs on the residual risk components of projects, e.g. untested technologies and interventions, or at early stages of project development;¹²³
- creating a sound policy environment for climate finance products to mitigate risk and enable project development at the pre investment phase, including extending loan duration.

Recommendations specifically for the Private Sector Facility

Invest in waterfall-structured funds

The UNEP Finance Initiative starts with the observation that there are three principle avenues for the PSF to reach targeted private sector groups in the emerging/developing economies: (i) engaging with local FIs, (ii) co-financing equity or venture funds, (iii) providing risk reduction support to projects.¹²⁴

An appropriate approach to attract private capital is to combine both private and public capital in a public-private partnership (PPP) by setting up a tiered risk-sharing structure, or “waterfall”. The liabilities of a waterfall-structured fund consist of several types of tranches with different degrees of risks. Private investors could invest in less risky senior tranches, donor countries would hold more risky junior tranches. First loss provisions for the public sector can also be considered.

Focus on early entry and on scaling up

A Brookings report defines the focus for the PSF as: (i) “using public funds to support early entry projects at the country level that will be of sufficient scale to help transform markets and thus pave the way for further private investment” and (ii) “catalyzing private capital with innovative tools that will attract the private sector as an investor at scale”.¹²⁵

The facility could have two modalities.

¹²² Summary of National, Regional and International Development and Private Finance Institutions Workshop, Johannesburg, South Africa, 29-31 August 2011. Submission to the Transitional Committee for the Design of the Green Climate Fund.

¹²³ Basel 3 will increase the risk capital reserving costs for risky projects, making climate investments more costly for project proponents

¹²⁴ UNEP Finance Initiative: “The Green Climate Fund (GCF): The private financial sector’s perspective”. Submission to the Transitional Committee, 1 August 2011

¹²⁵ Katherine Sierra: “The Green Climate Fund: Options for Mobilizing the Private Sector”. Brookings Institution. December 2011

One modality would support country-based, private sector operations that are consistent with NAMAs, and that have a focus on early market entrants and market transformation.

The second would be a Private Sector Innovation and Scale-up Facility to support ideas for scaling up, using competitive processes to select innovative proposals and sponsors. To have maximum impact on GHG reductions; innovation programs should be global, regional or sectoral.

Examples of high leverage interventions include support for energy service companies; energy efficiency projects with high returns and potentially very high demonstration and diffusion rates; and on-lending through financial intermediaries in countries with poorly developed credit markets.

An example of a specific tool is credit lines with performance incentives for private banks to develop new climate compatible products. Donor funded performance bonuses or interest rate reductions would provide domestic financial intermediaries with the incentives to achieve certain milestones or targets established at the onset of the program. Carbon price support mechanisms can convert carbon-linked cash flows into equity and debt funding for the initial capital funding of low-carbon projects.

Overcoming constraints at various stages of a project cycle

Climate Change Capital distinguishes between risks and barriers that relate (i) to “factors applicable to any investment”, (ii) to “project and technology specific factors” and (iii) to “factors limiting the significant scaling of investment”.¹²⁶ It recommends that GCF stay away from the first and “focus on addressing barriers and risks that are specific only to climate change mitigation projects and how to significantly increase the access to capital for these projects.” The report provides practical examples of how GCF assistance can help overcome financing constraints at various stages of a project cycle: at the upfront project preparation stage, at the financial close stage and at the refinancing stage. The recommendations include:

- “for energy efficiency projects, where the economic signal can often be adequate, the GCF private sector facility should consider instruments that guarantee or insure agreements covering loss from default;”
- “the GCF should look to provide funds for the refinancing of performance contracts or guarantee the receivables, which would help recapitalize Energy Service Companies (ESCOs) to develop further energy efficient projects”.
- “to support investments in industrial gas projects through an “Emission Reduction Underwriting Mechanism (ERUM) instrument, which is a form of performance or results based payment to projects: only after the mitigation is certified would the GCF cover the cost of the mitigation”;
- “considering that in waste management an economic signal is often missing, an ERUM may be the most effective mechanism for mobilising private sector investment”;
- “in RE, such as wind power projects, the GCF private sector facility could look to enhance or fund the payment of the tariff in cases where the economic signal is inadequate.”

Choice of PSF-instruments

A Brookings Institution report proposes five criteria for choosing instruments for the GCF: (i) alignment with the GCF design principles, particularly that of “country ownership”; (ii) effectiveness in terms of impact and

¹²⁶ Steven Gray and Nicholas Tatrallyay: “The Green Climate Fund and private finance: Instruments to mobilise investment in climate change mitigation projects. Climate Change Capital.

results (market transformation and GHG reductions); (iii) scale (best use of scarce public funds to achieve leverage and scale to reach environmental, economic and financial sustainability); (iv) efficiency (deliver money with little “friction” losses from costs of intermediation and organizational costs); (v) innovation, learning and partnership (support learning while doing best practices and promoting partnership with the private sector).¹²⁷

An article in Carbon Finance magazine on instruments to be offered by the PSF lists ten that were prioritized in a private sector survey as being effective in leveraging significant private capital.¹²⁸ The author arranged these ten into three categories.

- *Instruments which directly fund the outcome of the project:* (i) advanced market commitment (AMC) for bio-carbon investments, (ii) subsidised feed-in-tariffs for RE, (iii) a bankable power purchase agreement-like instrument for EE (in essence, setting a tariff for virtual energy saved/MWh, putting EE project finance on a par to that for RE).
- *Instruments which help to reduce risk at some point in the financing cycle:* (iv) a mono-line insurance mechanism to absorb credit risk by providing a first-loss guarantee, (v) a clean energy loan guarantee mechanism, (vi) a political risk insurance mechanism for climate-related investments; (vii) a public-private fund to absorb potential first loss from high-risk investments in LDCs and (viii) mezzanine debt enhancement.
- *Instruments that have a strong social element that will act to transform the society in which they are rolled out by building knowledge and project implementation capacity:* (ix) a pooled fund for small-scale venture capitalists to promote low-carbon social enterprises in least-developed countries (LDCs); (x) a revolving fund for low-carbon social enterprise focusing on energy access.

All ten instruments are likely to be part of the GFC’s portfolio of instruments. But for the PSF, the ‘outcome instruments’ are not relevant. They are instruments for financing the additional costs of climate investments; and as such part of the national climate programs, which receive support from GCF.

Supporting early stage project investment

The CMIA points to the lack of access to finance for the development stages of RE projects.¹²⁹ There is a significant dearth of development capital in many countries, because development risks are high and often there is no certainty that key contracts will be achieved. Early stage development finance must come from local entrepreneurs and corporations, but many other sectors offer higher returns, with less risk and shorter paybacks. The PSF is to offer a pool of development capital to be accessed for early stage project investment to increase the breadth of projects being taken through feasibility to bankability.

Bank finance is a problem for EE; it is not readily available on a project basis (limited recourse) because projects cannot be structured in such a way as to provide appropriate certainty and security to banks.

¹²⁷ Katherine Sierra: “The Green Climate Fund: Options for Mobilizing the Private Sector”. Brookings Institution. December 2011

¹²⁸ Abyd Karmali: ”Engaging with the Green Climate Fund” Carbon Finance magazine, 23 August, 2012

¹²⁹ CMIA response to the Transitional Committee’s questionnaire on the design of the Green Climate Fund 12 August 2011

Encouraging first movers in LDCs and SIDS

First mover climate projects in LDCs and SIDS often have higher development and transaction costs which can prevent private sector engagement even for projects that are economically viable. A number of publicly funded development facilities share and lower these costs using a range of approaches.

One approach is to *share the transaction costs of project development*. A soft loan facility approved by the CDM Executive Board at COP15 is to finance the costs associated with preparing CDM projects in countries with few registered projects to date. Examples of CDM project preparation facilities are the UNEP/ Standard Bank managed African Carbon Asset Development Facility and the UNDP managed MDG Carbon Facility.

Another is *project development companies*, entities with an explicit mandate to develop projects, usually providing the equity financing and additional expertise needed to undertake all the preparatory steps to financial close. The Norwegian funded SN Power and the multi-donor funded InfraCo are two examples of infrastructure development companies although neither focuses exclusively on climate projects.

A third approach, used for business ventures, is *match funding* - funds paid in equal amount to funds available from other sources - which for example is being employed in Singapore through the SPRING Startup Enterprise Development Scheme.

Suggestions for encouraging first movers in LDCs and SIDS include:¹³⁰

- Direct financing of pilot investments with targeted debt and equity instruments.
- Project development and transaction cost sharing facilities to generate pipelines of bankable projects.
- Seed investment facilities that finance early stage project developments.
- Risk sharing approaches that spread the risks amongst those best able to manage them, including governments, insurers, investors, banks and project developers.
- Public sector capacity building that catalyses improved policy and institutional frameworks.
- Private sector skills development that assists commercial financial institutions and industry actors in developing new climate relevant products and business segments and in establishing project evaluation and appraisal procedures for climate technologies.

Invest in private equity funds

A recommendation made by many is for the GCF to invest in equity funds.

It was a key recommendation coming out of the Singapore consultations organized by ADB. “The GCF should consider making investments with a share of up to 20 percent in a number of private equity funds, serving as an equal Limited Partner. .. taking a ‘fund of funds’ approach; while not all investments may succeed, at a portfolio level there will be net returns to reinvest in the grant portion of the GCF.”¹³¹

A Brookings Institution report on governance issues for the PSF reaches a similar conclusion.¹³² It expects that the Board will implement a strategy that emphasizes market transformation, scale and leverage and that the PSF will invest in funds managed by others.

¹³⁰ Workshop on the role of the Green Climate Fund in fostering transformational change, engaging civil society and leveraging the private sector Discussion note Geneva, 11 September 2011

¹³¹ Regional Consultations on Climate Change Financing Singapore, 1- 3 September 2011

¹³² Katherine Sierra: “The Green Climate Fund’s Private Sector Facility: The Case for Private Sector Participation on the Board”. Brookings Institution, August 2012

Annex III: Matrix showing the portfolio of RE support instruments

The portfolio of financial support instruments to increase the market share of RE-generated electricity is summarized in the matrix below. The rows identifies *four potential financing sources* for subsidies to RE: (i) subsidies financed by the public budget, (ii) subsidies raised through electricity invoices, (iii) subsidized export credits for RETs and soft loans from development banks, (iv) payments for greenhouse gas reductions from use of RE. The columns point out *three potential subsidy targets*: (i) subsidies to investments, (ii) subsidies to output, (iii) subsidies to the cost of operation.

| FINANCING SOURCES | SUBSIDY TARGETS | | |
|--|--|--|---|
| | Cost of Investment | Price of Output | Operating Costs |
| Public Budget Finance Instruments (tax payer financed) | Grants to project preparation Investment grants per MW or in % Investment tax credit Concessional/soft loans VAT exemption Import duty exemption Accelerated depreciation Tax holidays on income <i>Subsidies to exporters of RET-equipment</i> <i>Subsidies to R&D&D</i> | Production tax credit per kWh Topping-up premium per kWh paid to generator (FiP) Green kWh-premium paid to consumers opting for green electricity supply Auctions/tenders for green topping-up premium (FiP) | <i>Subsidies to the marketing of green electricity</i> |
| Electricity invoice financed instruments (rate payer financed) | <i>Grid reinforcement (deep connection costs) paid by utilities</i> <i>Part of (shallow) connection costs paid by utilities</i> <i>R&D&D of power utilities on interfaces between windfarms and regional/national power system</i> | Feed-in-tariffs (FiT) Green topping-up premiums Net/reverse metering Voluntary green consumer premium tariffs Renewable portfolio standards Auctions/tenders for technology specific PPAs/(FiTs) <i>Eco-taxes on alternative fuels</i> | <i>Wheeling tariff below the true cost</i> <i>Balancing costs charged to consumers</i> <i>Use-of-system charges fixed below cost</i> <i>Subsidized administration of green invoicing</i> |
| Carbon market mechanisms | | CO₂-certificates (cap-and-trade) CO ₂ -certificates (project specific CERs/ERUs per MWh) | |

Source: Author

The difference between text in italic, in bold and in normal letters refers to two further categorizations:

- One is the distinction between direct and indirect support to investors. The instruments providing their support to individual investments in an *indirect manner* are indicated in italics.
- The other is between price based (the market response determines the level of annual investment) and quantity based (the market response determines the output tariff or investment subsidy) support mechanisms; **quantity based mechanisms** are indicated in bold.

Annex IV: Private-Private-Partnerships for developing climate projects

The high cost of the “early entry / immature technology” situation is a feature that low-carbon policy needs to address. The market for climate technologies is particularly uncertain. Because it is policy driven the financial incentives for its development are subject to the vagaries of public policies; and the transformation to a low-carbon economy depends on significant adjustments in infrastructure, the implementation of which also depends on policy decisions.

The situation leads to important private-private-partnerships in technology development, also between competitors: e.g. alliances between car manufacturers for the development of improved battery technologies for electric cars, or for cost reductions in the technology for hydrogen-powered vehicles.

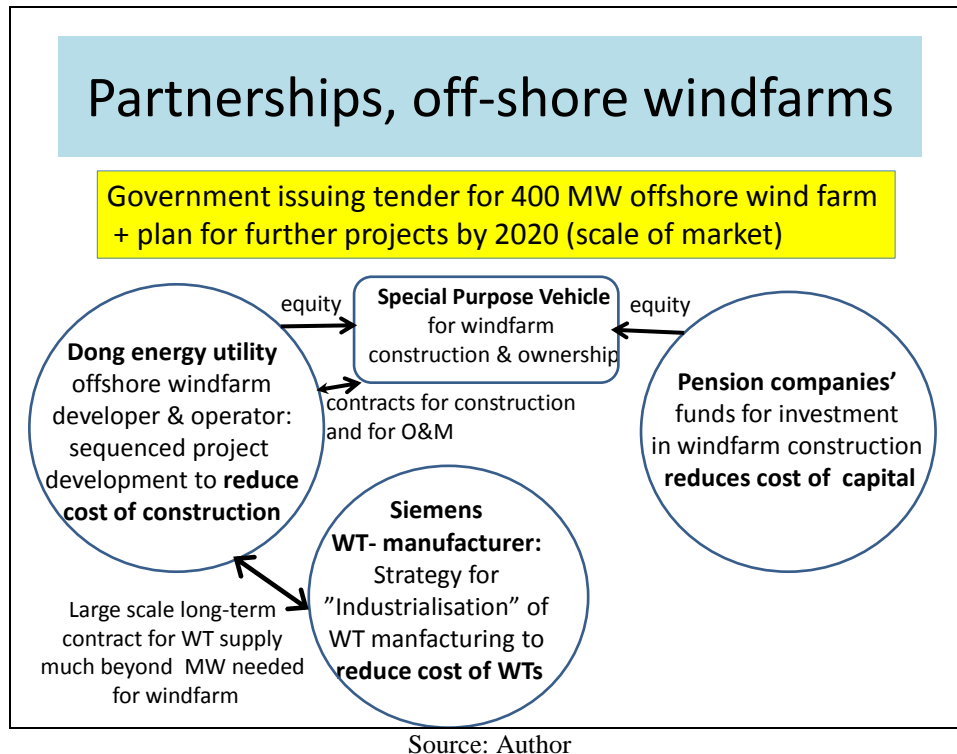
The chart below shows how a successful private-private partnerships to reduce both investment costs as well as investment risks for all parties was organised.

Below, a case study is given of an integrated partnership from the offshore windfarm sector. It developed by itself as each partner saw a competitive advantage in the partnership. But it illustrates how private-private partnerships can support Government climate policy.

Policy situation: The governments of Denmark, Germany and the UK set ambitious policy targets for the development of offshore windfarm capacity in the North Sea and Baltic Sea region during the next ten years. The high cost of the technology makes the realization of the targeted investment dependent on the payment of large tariff premiums for the output of the farms, and, thus, on the political acceptability of the size of the subsidy cost to electricity consumers and to society.

Technology status Investments in offshore windfarms are new territory for all involved agents: wind turbine manufacturers, construction firms, developers, windfarm operators, finance institutions. Offshore windfarms have higher costs than onshore windfarms in construction and in O&M and higher risk of cost-overruns in construction and in O&M. Unlike on-land windfarms, offshore wind projects lack fixed price turnkey contracts. Projects are developed under a multi-contracting strategy where the developer is the one liable for the interface risk between the individual contractual packages.

Financing Project risks are highest in the construction stages. For this reason, the investments in offshore windfarms have been funded largely through utilities’ balance sheets; and the participation of development banks in bank consortia has been essential for getting commercial banks onboard. Once the plant enters stable production, the risks are lower; hence, institutional investor appetite exists for investments in operational assets.



A triangular private-private partnership was established in a two-on-two fashion between the energy utility Dong Energy on the one side and the windturbine manufacturer Siemens and the Danish pension funds on the other: Dong Energy signed collaboration agreements with each.

The aim of the two partnerships is to accelerate the development process and drive down the costs of new offshore windfarms. Siemens (interested in becoming a major provider of offshore wind turbines) and Dong Energy (interested in becoming a major offshore windfarm developer and operator) are aware that the policy goals are based on the implicit assumption that the cost of new windfarms will go down during the ten years. For Siemens and Dong Energy, the achievement of cost reductions is, therefore, more than a competitive parameter within a market: it is a condition for the existence of a market for offshore windfarm technology.

The driving force for the partnership is the search for economies of scale.

The **strategic vision of Siemens** for its offshore wind turbines is to drive down the cost of its turbines through the 'industrialization' of wind-turbine manufacturing: to undertake production as a continuous process similar to car manufacturing, and not in reaction to ad-hoc orders from wind turbine developers. The 'industrial mode of production' requires the certainty of a large and long-term order book.

Dong Energy's strategy in offshore wind is to focus on activities where it has a comparative advantage in value creation: project development and construction and the operation of windfarms; to be the owner of operating assets is not key to its profit maximization. The strategy to reduce the cost of windfarm construction has four interacting components. One is a framework contract with Siemens for the delivery of 1500 MW of turbines over a specified number of years; in return for the large order, Dong Energy got a price discount. The other is investments in the technical supply chain (harbor facilities, specialised ships for construction, etc.) so Dong could be certain that required inputs to a construction project are delivered at the precise time when they are needed and that it controlled the cost of these inputs. The third is to sequence a number of windfarm projects in a way so that specialised resources (for design, planning, construction) are

busy at any time. The fourth is to get institutional investors to co-finance the cost of construction, thereby eliminating the restriction on total investment from using only own balance sheet finance for investments in project development and construction – as relative small utility to become a large windfarm investor is a challenge – and, at the same time, reducing the cost of finance for construction.

A new finance vehicle was conceived which enables institutional investors to engage in the financing of the construction of offshore windfarms. Because the construction phase in a new technology such as offshore windfarms is too risky for pension funds, they would, previously, only consider investing in the refinancing of a windfarm upon commissioning. Dong Energy won in June 2010 the Danish Energy Agency's tender for the 25 year concession for the 400 MW Anholt offshore windfarm project with a bid asking for a feed-in-tariff of DKK 1.03/kWh (=18.3 UScents). The purchasing power agreement (PPA) is valid for the first 25,000x400 MWhs of output (roughly first 12 years of production), after which the power must be sold on the free power market. In March 2011, DONG sold the ownership of the concession to a 'Special Purpose Vehicle' (SPV), a Joint Venture Company (JVC) created by DONG (50%) and the two Danish pension funds PensionDanmark (30%) and PKA (20%). The objective of the SPV is to finance and own the project. It signed a fixed price construction contract and a fixed price (formula adjusted) 12 years O&M contract with Dong Energy, which removed the construction and operation risks from the JVC. The fixed-PPA tariff and the data from pluri-annual wind measurements at the construction site made it feasible for the pension funds to calculate the average annual revenue from their investment with a precision similar to an investment in Government bonds.

The SPV satisfied the **strategic interest of the pension funds**, who on the one hand, were interested in increasing the share of infrastructure in their investment portfolio, yet wanted to invest directly in infrastructure assets rather than in infrastructure funds whose 2% + 20% fee rates were deemed to be too high to leave an acceptable rate of return on investment.¹³³ The pension funds appreciated the time and risk profiles of their financial investment: the construction and operation risks are taken by DONG; the average annual revenue can be predicted with high certainty. The return on investment compares favorably with alternatives. The average annual returns from Anholt over the wind farm's 20-year lifespan are expected to be at least double the current Danish bond yields of just above 3 per cent.

¹³³ According to Paradigm Change Capital Partners: "Institutional investors going green", 2011, since 2004 infrastructure fund firms have launched 124 RE-focused infrastructure vehicles, 72 of which have held a final close, having raised an aggregate \$22.3bn in investor capital average. The target net returns for funds were between 12-18%; realized returns of the 15 funds closed so far varied from -13% to 21%.

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