Climate Finance:
Engaging the Private Sector

A background paper for “Mobilizing Climate Finance”,
a report prepared at the request of G20 Finance Ministers

October 31, 2010

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Context

The Secretary-General's High-level Advisory Group on Climate Change Financing (AGF) was set up with a clear task: to identify how to mobilize the USD100 billion per year by 2020 that was promised for climate change in Copenhagen in December 2009. The ensuing report concluded that it was "challenging but feasible" to meet this goal, and identified the private sector as being critical to the effort. A functioning carbon market, with carbon prices in the range of USD20-25 per ton, as well as judicious use of public funds, could generate around USD100-200 billion of gross private capital flows for mitigation – or net flows of between USD10-20 billion.[1]

With respect to the private sector, the report analyzed the barriers to private investment in mitigation and adaptation, discussed the options for deploying public sector interventions to overcome these barriers, and attempted to estimate the potential scale of international private investment. Key findings are that the potential for private investment is substantial, but that to unlock these flows, a range of existing country and project specific barriers will need to be overcome. This in turn will require appropriate domestic and international public interventions. Domestic public policies and programs, international public technical assistance and financial instruments, and carbon markets all represent the tools or levers that can be used to overcome market failures. The report suggested that the large potential for private investment to achieve climate-related objectives justifies using a substantial share of the public finding available to stimulate this investment.

The report concluded that "International private investment flows are essential for the transition to a low-carbon, climate-resilient future. These investments can be stimulated through the targeted application of concessional and non-concessional public financing. Careful and wise use of public funds in combination with private funds can generate truly transformational investments. Further work is recommended on finding the most effective use of grant funding for climate actions."[2]

The present paper attempts to build on the analysis contained in the AGF report to explore in greater detail issues related to private financing of low-carbon investment. Obtaining consistent data across the wide range of private investment flows directed to climate is a difficult task, since there is no systematic global data capture mechanism covering such flows. Climate financing is not disaggregated from other private investment flows, and the coverage provided by specialized market analysts and industry groups is patchy. However, there is one class of market player that is active in supporting climate-related private investment in developing

[1] The AGF report introduces the concept of net benefits of gross private flows – calculated as the reduction in return that a private investor is prepared to accept for the risk-mitigation or revenue enhancement provided by public funds. This portion represents a net gain to the recipient country.
[2] Advisory Group on Climate Change Financing (AGF). (2010). *Report of the Secretary-General's High-level Advisory Group on Climate Change Financing*, November 2010. United Nations. para 28, p 10.

countries: multilateral development banks (MDBs) that operate in the private sector. These banks do track the financing they provide, and have experience in deploying several of the instruments that the AGF report refers to (technical assistance, concessional and non-concessional public finance). They represent, therefore, a reliable and ready source of information that can be analyzed to shed greater light on questions surrounding private sector climate finance.

Structure of paper

This paper is focused on climate-related investment in developing countries. It provides the reader with an overview of climate-related activities, clarifies the terminology and discusses the sources of finance and public support.

1. Section 1 gives an overview of current investment in climate-related activities.
2. Section 2 defines a typology of private sector investment according to stage of technology development and type of project/investment.
3. Section 3 outlines the risks faced by a private investor in emerging markets, how these risks are typically mitigated, and discusses how barriers to low carbon investment can exacerbate these risks.
4. Section 4 discusses the different types of support relevant for the private sector and, building on the experience of the EBRD and IFC, the leverage associated with the different project types and support sources. Case studies of innovative use of concessional finance are also provided.
5. Section 5, using the two main available sources of information, assesses the level of investment that will be required for a 2°C pathway and concludes with a description of the support mechanisms that will be needed to mobilize private flows.
6. An Annex provides a list of interesting initiatives being implemented by other inter-governmental organizations and agencies that also speak to improving private sector engagement in the climate investment space.

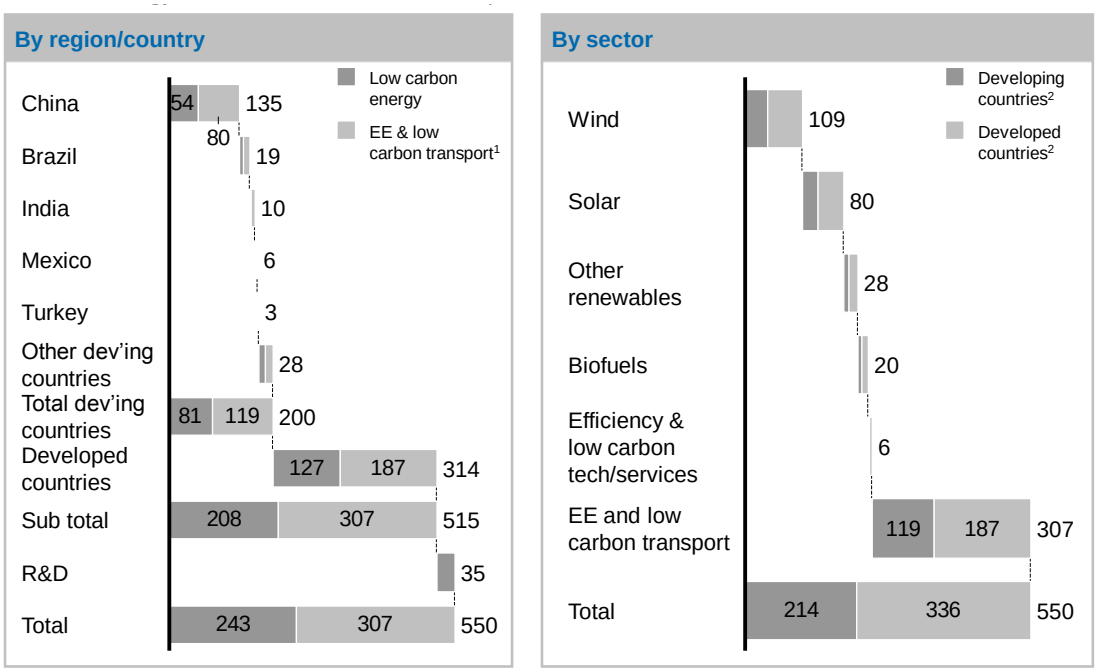
Section 1. Current Investment in Climate-related Activities

It is surprisingly difficult to obtain consistent and comparable data on climate-related investment, since the entities that report such data use different definitions of climate finance and report on different aspects of it. There is no standard definition of climate finance that is universally used. While there is one statistical system in place that tracks international public climate finance in the form of ODA,[3] it largely covers only bilateral donors. No such data or statistical system exists to define and track private climate finance. Most data sources that track investment do so for renewable energy and energy efficiency; some include low-carbon transport. Furthermore, investments are not tracked consistently and separately for public and private sectors or for emerging or developed markets. In addition, private climate finance data, limited as it is, tends to be commercial and available only upon subscription.[4]

[3] The so-called Rio Markers are policy markers that are used to monitor climate change specific aid. See OECD Development Assistance Committee – Creditor Reporting Service (DAC-CRS).
[4] See also Buchner, Barbara, Jessica Brown and Jan Corfee-Morlot. (2011). *Monitoring and Tracking Long-term Finance to Support Climate Action.*, May 2011. OECD/IEA Project for the Climate Change Expert Group on the UNFCCC.

From estimates by PEW and HSBC, shown in the chart below (see Figure 1), [5] it appears that in 2010, over USD200 billion were invested in low-carbon investment in developing countries – about 40% of total investment. China alone accounted for two-thirds of the total investment going into developing countries, with Brazil, India, Mexico and Turkey accounting together for close to one-fifth.

Figure 1: Worldwide low-carbon investment in 2010 (USD billion per annum)



1 EE and low carbon transport allocated proportionally (Total EE & low carbon transport in 2010: USD 180bn)
2 Pro-rated split between developing and developed countries

SOURCE: PEW, HSBC, team analysis

Renewable energy accounted for over 40% of total investment globally (both developed and developing), within renewables, wind alone accounted for 46% of investment with solar coming in second with 34%. Energy efficiency (EE) and low carbon transport consist of transport efficiency (approximately 40%), building efficiency (around 30%), industrial efficiency (around 20%) and energy storage and smart grids (around 10%). The private sector's share in these flows is not known with any certainty. One estimate indicates that private climate finance provided between USD60-160 billion over 2008-2010; the broad range of estimates is symptomatic of the low quality of data.[6] Recent UNCTAD estimates suggest that FDI flowing from developed to developing countries in this area amounted to about USD37 billion in 2008.[7] Renewable energy accounted for half of the new electric capacity added globally in 2010, with investment in developing countries surpassing that in developed countries.[8] However, as

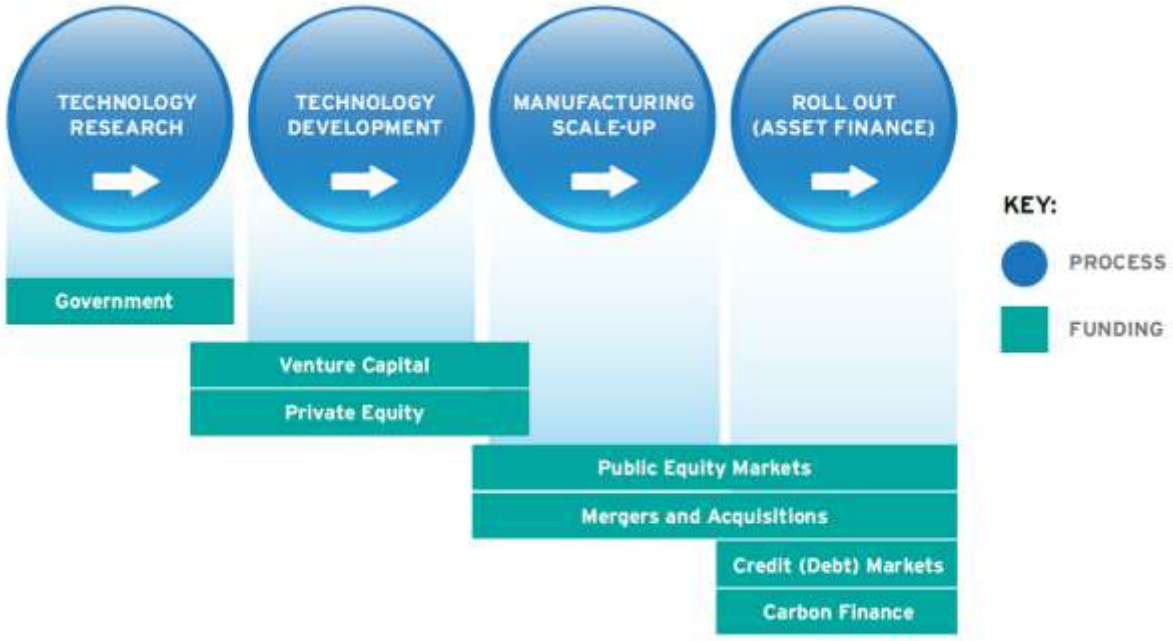
[5] The estimates were derived using data from PEW (2010). *Who's winning the clean energy race? G-20 Investment Powering Forward.* Pew Charitable Trust and Robins, Nick et al. (2010). *Sizing the climate economy.* September 2010. HSBC Global Research
[6] Stadelmann, Martin, Paula Castro, Axel Michaelowa. (2011). *Mobilising Private Finance for Low-Carbon Development*. September 2011. Climate Strategies
[7] UNCTAD (2010). *World Investment Report: Investing in Low Carbon Economy* 2010
[8] REN21.(2011) *Renewables 2011 Global Status report* Paris: REN 21 Secretariat

described in the section below, private sector climate-related investment encompasses a broader range of activities than those covered by these data sources, and so the estimates are likely to be understated.

Section 2. A Typology of Private Sector Investment

Private sector climate-related activities encompass a wide variety of sectors and project types; most (if not all) are concentrated on mitigation. The diagram below shows the stages of low-carbon development and deployment, as well as the financing sources typically associated with them (Figure 2). Research will typically be funded by government, even if undertaken by the private sector. Technology development is generally financed by early-stage venture capital and private equity firms interested in making technology "bets" and prepared to take a portfolio approach to risk. Once there is proof of concept, manufacturing and commercial deployment of the technology can be financed by public equity markets; often, established players will acquire new technology through acquisitions. In addition, debt and project finance come into play in scale-up and commercial roll-out of the interventions.

Figure 2: Mapping sources of financing to stages of low-carbon technology development



Source: Bloomberg New Energy Finance

Most deployment of low-carbon technology in developing countries will take place at the later stages of this continuum. Different financing sources come into play at the different stages. For the types of investment typically encountered in developing countries, financing comes from equity, both private and through public markets, and through debt. Most MDB financing has been for projects at the manufacturing scale up and asset finance (project finance) level. Sources of finance for low-carbon investment in developing countries are discussed in Section

4. Although carbon markets have provided resources to low-carbon projects via the Clean Development Mechanism, overall flows have been small relative to investment needs.[9]

Within these development stages, the types of low-carbon projects typically encountered in developing countries are described below.

Renewable Energy

Renewable energy (RE) capacity investments use a range of technologies, each representing very different characteristics. Such projects can be both grid-tied and off-grid. Traditionally, renewables consisted of biomass, used for heating and cooking, and hydroelectricity. New renewables include wind, solar, geothermal, small hydro, modern biomass and biofuels. Together, renewables comprised one-quarter of global power capacity from all sources and delivered 18% of global electricity supply in 2009.[10] Availability of limited recourse project debt is key to facilitate the growth of independent power producers due to the capital intensity of the sector.

Renewable energy technologies are at differing stages of cost-competitiveness with conventional fossil-fuel based energy, with some technologies at or close to grid-parity. Not surprisingly, private investment flows to those countries where a suitable policy regime is in place – more than 100 countries have enacted some type of policy target with respect to renewables, including renewable portfolio standards requiring the provision of a certain share of electricity from renewable sources, and preferential price and tariff support. Developing countries account for more than half of global renewable power capacity, and make up more than half of countries with policy targets or renewable energy promotion policies.[11]

Energy Efficiency

Energy efficiency (EE) represents a significant emissions-reduction opportunity and also encompasses a wide array of sectors. Energy efficiency improvements can take place on both the demand and the supply side, and commonly represent the least-cost option for freeing up generation capacity. Improvements in generation, transmission and distribution (here called Power Energy Efficiency or PEE) result in more efficient supply of energy. On the demand side, improvements in energy use in buildings, appliance standards, lighting, industry, transport can all contribute significant reductions in overall energy use.

PEE projects will generally take place in the power utility through balance sheet financing and the issue of corporate debt. Industrial Energy Efficiency (IEE) lends itself to both this type of direct financing and indirect financing through financial intermediaries, e.g., leasing companies. Since many IEE projects are small in size, MDBs typically finance them via a financial intermediary (FI) in the country concerned. This intermediary could be a local bank or private equity fund, or an Energy Service Company (ESCO)[12].

[9] Carbon finance is the subject of another background paper and is not discussed here.
[10] REN21 2011
[11] REN21 2011
[12] An ESCO is a business that develops, installs and arranges financing for energy efficiency projects for a third party, typically sharing in the cost savings with the recipient through contractual arrangements.

RE and EE supply chains

Increases in Renewable Energy and Energy Efficiency investment will require a corresponding increase in the manufacturing of components that feed in to the RE and EE supply chains. Examples of such components include wind turbines, or solar photovoltaic devices such as solar cells and modules, and building insulation materials.

Waste Management

The collection, transport, processing, recycling and disposal of waste – both liquid and solid – offer energy and EE opportunities. Activities typically encountered include land-fill gas capture or waste-to-energy projects. Livestock projects with manure management or emissions mitigating features could also offer private sector investment potential.

Agriculture and Forestry

To date, private sector interventions in carbon-sequestering agriculture and land use activities, as well as forestry, have been limited seen from the MDB financing perspective. However, these could well represent significant private sector investment potential going forward.

Cleantech

Cleantech is a cross-sectoral investment theme. For the purposes of this paper, cleantech investing refers to venture and growth capital stage investments in companies whose products and services support significant natural resource efficiency and/or pollution abatement (including, but not limited to, GHG emissions abatement). The range of sectors cleantech covers is broad, however, EE and RE sectors dominate investment volumes. In sustainable energy, sub-sectors include: new renewable energy technologies or business models (particularly solar); industrial and end-user energy efficiency; advanced energy storage; and biofuels. Other cleantech sectors include: IT applications for process monitoring and control to support resource efficiency (for example, smart irrigation and smart cold chain management); more efficient water use, waste water treatment, or desalination technologies; sustainable agriculture (for example, sustainable pest control, saline or drought resistant seeds); clean transport; green buildings; bio-chemicals; recycling. Limited clean technology development takes place in developing countries: three-quarters of the over USD 8 billion venture capital financing in 2010 among G-20 countries took place in the United States, with China in a distant third place at around USD300 million.[13]

Adaptation

The private sector will not be immune to climate risk and impact, and will have a role to play in adaptation investments. An activity could be considered an adaptation investment if it reduces the risk, exposure or sensitivity of human or natural systems to climate change; increases climate resiliency; builds problem solving capacity to develop responses to climate change or addresses impacts exclusively linked to climate variability and change. In practice, it is very difficult to disaggregate that portion of an investment that is linked to adaptation and that which is sound development. Building climate resiliency into project design, particularly for long-lived assets; incorporating climate models into hydrological surveys for dam construction; taking climate considerations into account when designing and building new infrastructure in coastal

[13] PEW 2010

areas – these are all examples of sound development in the face of a changing climate. Given the relatively limited experience to date on private sector adaptation investment, it has not been possible to develop a typology of private sector adaptation investment, much less draw any lessons on financing structures or leverage. The OECD DAC database indicates that multilateral support for climate change adaptation amounted to USD12.2 million on average over 2008-09; it is not known how much, if anything, was directed to the private sector. Data on bilateral support for climate change adaptation will be available at the end of 2011.[14] UNEP estimates that bilateral support to adaptation amounted to close to USD4 billion in 2009 from four institutions alone.[15] However, as with other published information on climate finance, there are a number of definitional caveats, and the portion of the flows directed to the private sector remains unknown. Clearly, this is an area where further work is needed.

Section 3. A Private Sector View of Risk and Barriers to Investment

Private firms make investment decisions based on the project's commercial viability. Prospective investments are thus expected to cover the full costs of the project, including the cost of capital, and achieve a return commensurate with the risks associated with a particular project. This principle drives private investment across economies, rich and poor.

Risks Faced by the Private Sector and their Mitigation

Table 1 below provides a typology of risks likely to be faced by a private sector investor in any investment in emerging markets. It does not purport to be exhaustive; neither is it meant to imply that all projects face all these risks in all emerging markets. It is provided as an illustration of the risks that an investor will consider in a typical financial assessment of an investment proposition.

[14] OECD-DAC. (2011). *Tracking aid in support of climate change mitigation and adaptation in developing countries*. September 2011. www.oecd.org/dac/stats/rioconventions
[15] UNEP (2010). *Bilateral Finance Institutions and Climate Change – A Mapping of 2009 Climate Financial Flows to Developing Countries*. UNEP 2010

Table 1: Risks faced by Private Sector Investors in Developing Countries

	RISKS	INVESTOR NEEDS	EXISTING INSTRUMENTS
PROJECT RISK	• *Costs – capex & opex* • *Revenue volatility* • *Resource risks* • *Technology risk (higher if limited performance track record or limited market penetration)*	• Risk assessment • Returns commensurate with risk	• Due diligence, feasibility studies • Commercial insurance • Creditworthy off-take agreements • Turnkey construction contracts
COUNTRY RISK	Regulatory risk • *pricing policy - market distortions* • *weak IPR* • *tax and subsidy regimes* • *contract enforcement* Foreign exchange • *convertibility* • *exchange rate stability* Sovereign risk • *nationalization and appropriation* • *economic and political situation of country*	• Policy certainty, clarity, longevity • IPR protection • Rule of law • Repatriation of capital • Macroeconomic stability • Political stability • Political risk cover	• Partial risk guarantees covering public performance • Hedge, swap markets • ECAs • MIGA • MDBs
FINANCING RISK	• *Debt availability* • *Adequate debt tenors* • *Reasonable debt terms (limited recourse / collateral / leverage ratios)* • *Equity availability*	• Access to financing on terms that provide for adequate returns to sponsor equity	• MDBs • NDBs • Bilateral development banks • IFIs • Capital markets

At the project level, the key risk will be the overall financial viability of the project – cost structure, markets, availability of inputs and certainty of revenues, to name a few defining factors. Technology risk would include risks associated with high first-mover costs and unproven commercial application of a new technology. A number of country risk factors will come into play, including regulatory issues related to pricing, protection of property rights, tax and subsidy regimes and contract enforcement. A foreign investor will want access to foreign exchange and the ability to hedge exchange risk. Other sovereign risks relate to nationalization, overall economic and political stability of the country in which the investment takes place, and the ability to repatriate profits. Financing risk concerns the availability of financing at affordable cost and required tenors.

The private investor will invest in those activities and in those countries where the risks identified above can be mitigated. The bulk of climate-related investment currently takes place with existing mitigation instruments for the risks identified above. Project risk is assessed through the investor's due diligence process, and addressed in the project structuring. A strong contractual agreement with a creditworthy party may mitigate the project's offtake risk; insurance products may provide comfort on business interruption; foreign exchange risk may be hedged where such instruments are available. Political risk insurance can cover certain sovereign risks. Sometimes governments will provide explicit undertakings, such as a feed-in tariff and incentive tax regimes. MDBs are able to structure financing packages that provide long tenors with de facto political risk cover; they can also provide partial risk guarantees to provide comfort to investors on government performance.

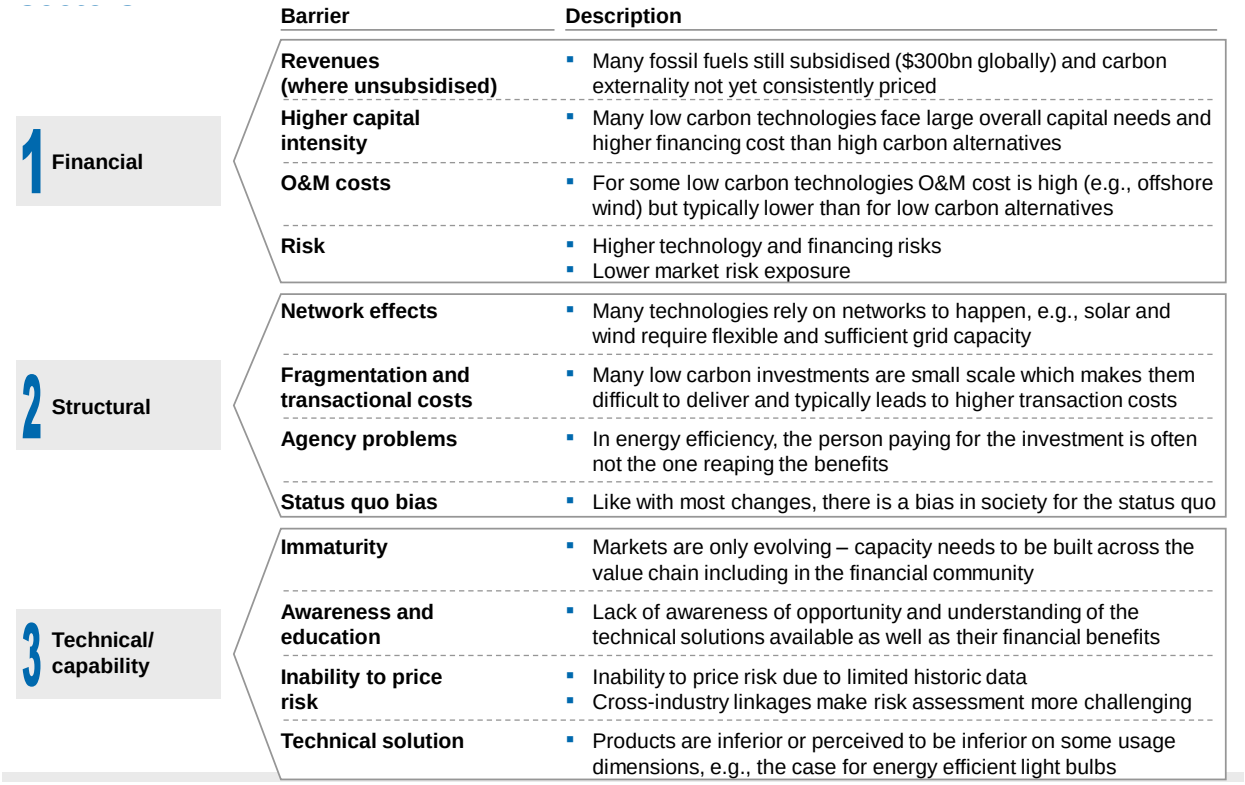
However, and particularly in the area of low carbon investment, there exist certain barriers to investment, as discussed below, such that some of these commonly-used mitigants may simply not be available, or would render the economics of the project unattractive. Low-carbon technology often faces an incremental cost disadvantage, for example. Increasing low-carbon investment will require that these barriers be addressed so as to bring perceived or real project risk down to levels that can be mitigated by the market. However, there may still remain some risks for which public finance will be needed in order to catalyze private capital flows in order to accelerate deployment of low carbon technology. The key to achieving the maximum leverage of private investment per public dollar will be to mitigate such perceived or real risks using existing instruments and structures to the fullest extent possible, and using public funds as critical "last resort" support.

Barriers to Investment

Barriers to low-carbon investment may be financial, structural or technical, as outlined in the chart below (

Figure 3). Financial barriers will discourage local businesses, project developers, vendors, technology providers from offering low carbon solutions to the market, and hamper institutional and market financing mechanisms enabling such businesses to grow. Policy and structural barriers affect the viability and economic attractiveness of low carbon options, and policy and regulatory measures are essential for pricing the carbon externality. Finally, neither policy nor financing will achieve much if there are technology and technical capacity barriers that impede technological and business model innovation.

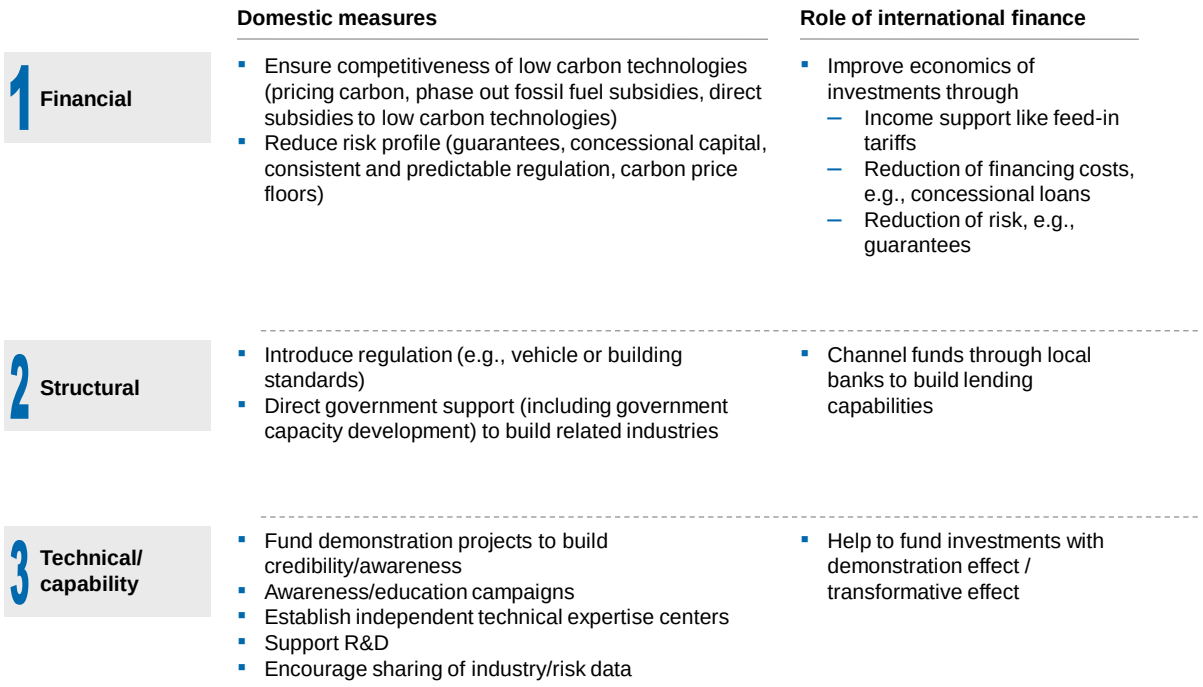
Figure 3: Three main categories of barriers to investments in low-carbon sectors



Addressing these barriers will require different domestic and international levers, as summarized in Figure 4. First and foremost is the right policy environment, conducive to private sector investment more generally, and to climate-related activity in particular. Fossil fuel subsidies, still prevalent in many countries, deteriorate the economics of low-carbon projects. Government intervention is required to create a level playing field between energy sources: removing fossil fuel subsidies[16] and pricing the carbon externality adequately will alleviate pricing distortions that currently work against RE and EE. Other policy and regulatory barriers or incentives – appliance standards, EE policies – need similarly to be brought into coherence to incentivize low-carbon growth. The chart below provides some examples of the sorts of policies required to encourage low-carbon investment. International finance can support these policies, but cannot substitute for them in any sustainable, effective manner.

[16] For a fuller discussion, please see the following paper prepared for the G20 - IEA, OECD, OPEC, World Bank: *The Scope of Fossil-Fuel Subsidies in 2009 and a Roadmap for Phasing out Fossil-Fuel Subsidies*, 2010.

Figure 4: Domestic and international levers to address barriers to low-carbon investment



More specifically, Table 2 juxtaposes some of the key barriers and solutions identified above with the project typology developed earlier. What is common across all project types is the lack of incentive for low-carbon investment created by energy pricing distortions. Markets are still immature in many of these technologies in developing countries, and measures to develop markets more generally, including awareness raising and building capacity to understand technical solutions, will be required to foster low-carbon investment. This capacity building extends across the value chain, including the financial sector. There is value in demonstration projects to build awareness and credibility. Risk reduction measures may also be needed to improve risk-return profiles and incentivize private investment.

Section 4 below describes in greater detail the policy and financial support required to address these barriers and risks, and provides some examples from MDB experience on the successful deployment of technical solutions using concessional financing and TA.

Table 2: Barriers for selected Climate Sectors in Developing Countries

Project Type	Key Barriers	How to address
Renewable Energy	• Fossil fuel subsidies • Large up-front capital cost • Some technology risk • Network effects	• Price externality • Feed-in tariffs • Predictable regulation • Risk reduction measures • Network upgrades • Develop project risk data
Industrial Energy Efficiency	• Energy pricing distortions • Lack of standards • Lack of ESCOs / in-house technical expertise • Transaction costs • Inability to price risk	• Develop and enforce standards • Local banking capacity • Risk reduction measures • Demonstration projects • Develop industry/risk data
Building Energy Efficiency	In addition to the barriers for industrial energy efficiency: • Agency problems	In addition to the measures for industrial energy efficiency: • Reduce builder-user information asymmetry by establishing building codes and performance standards
Supply Chains for RE and EE	• Dependent on downstream market	• Develop downstream markets for EE and RE
Cleantech	• Weak local venture capital or private equity markets • Most technology innovation originating from developed countries	• Support local R&D • Supportive tech transfer regime • Support local venture capital / private equity funds

Section 4. Policy and Financial Support required to Catalyze the Private Sector

This section is sub-divided into three parts. Part A describes the main instruments of policy support that are needed for low-carbon investment. Part B goes into the sources of finance typically available to finance low carbon activities, including financing of private sector investment by MDBs. Part C describes the instruments of concessional finance that have been used to date and provides some interesting case studies of innovative financing from the experience of EBRD and IFC, the two MDBs with the largest private sector financing experience.

A. Policy support

Private firms make investment decisions based on the project's commercial viability. Prospective investments are thus expected to cover the full costs of the project, including the cost of capital, and achieve a return commensurate with the risks associated with a particular project. This principle can often lead to under-investment in activities promising strong environmental and social benefits but lacking in required and reliable returns. In the climate

space, the key externality is carbon emissions, the cost of which is not yet integrated into decision making in any meaningful way in most parts of the world. Recognizing this, policymakers have long experimented with alternative strategies to induce the desired investment. In some economies, investments of this kind are undertaken by the public sector, with risks and costs borne entirely by taxpayers. Governments, seeking greater impact from their limited resources are now increasingly looking to approaches that leverage the capabilities, resources, innovation and efficiencies of the private sector.

Policy support is necessary to catalyze private investment in low carbon technologies. Public support typically takes the form of regulation or policy that creates an incentive to move a market in a desired direction. This can be provided via a regulatory framework or policy prescription which applies market-wide and is not directed to any one project or technology solution in particular. EE standards, for example, would apply market-wide, with any cost of compliance being internalized by the project and passed on to the client. The client in this case could be the consumer, who may pay a higher price for the good in question, or the government itself, which subsidizes the program. Feed-in tariffs and/or RE portfolio standards are another example of public support, with the cost of compliance generally being absorbed by the public sector. Depending on the nature of the subsidy and its delivery mechanism, the financing plan for the private sector investment would be completed on prevailing market terms by all parties involved, or through a blended package of commercial and concessional financing.

It is important to make a distinction between policy frameworks that make a technology or a solution economically viable and frameworks that enable commercialization and scale up by addressing the business environment, financing barriers, transaction costs and risk perceptions. Both are necessary to encourage low carbon investment.

Improving the Competitiveness and Viability of Low Carbon Technologies

Investment-friendly policies. Investment-friendly policies are critical to sustained private sector financing flows to developing countries. International money or specific climate-related financing cannot replace ineffective or counterproductive policy. This point cannot be stressed enough. Investment-friendly policies specifically geared to climate include RE portfolio standards, feed-in tariffs (discussed below), EE standards and appliance standards. These would be in addition to policies that aim to increase the overall ease of doing business.

Feed-in tariffs. A feed-in tariff is a policy mechanism designed to accelerate investment in RE. It consists of revenue support through a long-term purchasing agreement at some pre-determined rate, typically based on the cost of generation of the RE technology. The rate is usually set to provide enough of an incentive to the RE producer, and typically incorporates some “ratchet-down” mechanism to incorporate technological changes and cost reductions over time.

Energy pricing policies. Many developing countries subsidize fossil fuels or energy produced from fossil fuels. Such subsidies work against greater adoption of RE or EE. Energy subsidies are discussed elsewhere and will not be addressed here, except to underline their key role in incentivizing low-carbon investment.

Carbon offset markets. Carbon markets can provide a significant revenue source that can help improve the returns from private sector projects in climate-related areas, and in mature financial markets, financing can in principle be raised against future carbon revenues. However, this

paper does not discuss carbon finance given that it is treated in great detail in another background paper.

Once there is a case for competitiveness of a technology or low carbon option, there is a need for financing to enable commercialization and scale up.

B. Sources of Finance

As illustrated in Figure 2, different sources of finance will come into play at the different stages of investment activity. These sources range from outright government support (mostly for R&D activity) through venture capital and debt and equity markets. This section also discusses MDB experience in financing low-carbon investment and the role of concessional finance in catalyzing low-carbon investment.

Private Sources of Finance

A wide range of private sources can be tapped for the financing of private investment,[17] as long as risk-return expectations are met. These include the private companies themselves, local, regional and global commercial banks, non-bank financial institutions, leasing companies, private equity investors and institutional investors.

Financing schemes can take on a wide range of forms and complexity. In its simplest form, a private sector project could be financed on the company's balance sheet which itself will consist of shareholder's equity and short- and long-term debt. Additional equity finance may be provided by private equity funds, or raised through capital markets through share issues. Debt can be raised through borrowing from a bank, or through capital markets via the issuance of bonds or other commercial paper. Financing plans often increase in complexity with an increase in project complexity, and a variety of financial instruments may be utilized to complete a financing plan in a large project finance structure. For example, contractual arrangements embodying feed-in tariffs or other price support, such as take-or-pay provisions, can serve as collateral or otherwise provide comfort to lenders.

Private finance may be domestic or international. Some countries have mature capital markets, while others may not be able to provide private equity or long tenor debt or even take the non-recourse project financing structures upon which much privately financed infrastructure depends. In mature markets, international agencies can focus on addressing risk perception to catalyze private financing, while nascent markets may require a strengthening of the local financial sector and capacity building in order to do so.

Green Bonds

Green bonds are themed bonds focusing on low carbon investments. The market for climate bonds is a nascent one, and there are very few examples of green or climate themed bonds being used to raise financing by private sponsors for low-carbon energy projects. However, MDBs have successfully raised financing from pension funds and institutional investors through such instruments. While there are differences in the design of these instruments between the different MDBs, in general proceeds of the green bond issue are ring-fenced and applied to

[17] The paper refers to long-term financing needs; generally, the local banking sector is able to meet firms' short-term financing needs.

climate-related activities according to pre-defined eligibility criteria. The IBRD and IFC have both issued green bonds, as have the other MDBs, allowing them to reach new investors and to provide traditional investors with a new asset class – often the first taste that these investors have had of climate-related investment. The Climate Bonds Initiative offers the most comprehensive listing – albeit not exhaustive – and provides information on 28 issues, of which more than half are by MDBs or government entities. Nine issues are for wind or other renewables, and at least 2 of these have an explicit guarantee by a governmental agency. Total financing raised is in excess of USD12 billion – of which around USD3.8 billion were raised by MDBs for projects in developing countries. However, all the MDB green bonds have been against the overall credit standing of the issuing institution (as opposed to the underlying project credit). Furthermore, the financing raised by green bonds overall is a drop in the bucket when compared to the size of the global bond market – USD95 trillion outstanding in 2010, including over USD6 trillion issued in 2010.[18]

Public Sources of Support

Governments can support climate-related investment by the private sector through a variety of mechansims. Quantifying the financial value of such support is not, however, straightforward, since much of the support is implicit and embodied in policies and conducive enabling environments. The cost of the policy is sometimes passed on to the consumer directly, or provided through budgetary support. Furthermore, public support can be domestic, provided through the host country's budget, or it can be international, provided through public funds by donor governments as part of their official aid programs. Finally, the Global Environment Facility (GEF) and the Climate Investment Funds (CIF) are examples of mutlilateral public sources of concessional finance for climate-related investment in developing countries.

Export credit agency guarantees ECAs provide funds (direct loans) or guarantees to facilitate exports. ECAs can remove the risk and uncertainty of payments to exporters by shifting it to themselves in return for a premium. They can also underwrite the commercial and political risks of investments in overseas markets. In recent years, the majority of medium and long term official export credit flows that go from OECD governments to developing countries have supported GHG emitting sectors : transport (37%) and industry (26%), followed by energy projects (11%), of which about 1% is estimated to go to renewable energy and energy efficiency in the power sector.[19] Special liberalized rules governing the provision of ECA support for renewable energy and water projects were agreed by several OECD countries, who are also engaged in negotiations to further strengthen the ability of export credit arrangements to support action against climate change.[20]

Bilateral Support

OECD-DAC estimates that USD9.4 billion were provided in 2008-09 in the form of bilateral official development assistance (ODA) for climate change related activities, primarily mitigation.[21] Indeed, climate change mitigation-related aid represented 7.4% of DAC members' total bilateral ODA, with the largest donors being Japan and Germany. These figures include contributions to specific climate funds, such as the Climate Investment Funds. In addition,

[18] See http://climatebonds.net/ The Climate Bonds Initiative is a global civil society network and is a joint project of the Network for Sustainable Financial Markets and the Carbon Disclosure Project.
[19] Buchner, Brown and Corfee-Morlot 2011
[20] OECD (2010) *Arrangement on officially supported export credits*. January 2010. OECD
[21] OECD-DAC 2011

countries provide support through the multilateral system; in the same period, such assistance amounted to USD 429 million and was channeled through the Montreal Protocol, the Global Environment Facility and IDA. However, the portion of flows directed to the private sector is unknown; ODA generally flows to the public sector in recipient countries.

Another assessment of bilateral finance committed to developing countries is provided by UNEP, [22] which covers data from 4 bilateral institutions - the Agence Française de Développment (AFD), Japan's JICA, Germany's KfW and the European Investment Bank (EIB[23]). According to this report, these four institutions provided a total of close to USD13 billion towards mitigation and adaptation climate finance to developing countries in 2009, with the largest share coming from JICA (USD6.4 billion). As can be seen, even these two sources of data – OECD-DAC and UNEP – raise questions of comparability and are difficult to reconcile by the lay reader. Collection and reporting of data are plagued by the familiar-sounding litany of problems: a lack of universally accepted definition of what counts as mitigation and adaptation finance; differences in accounting periods (not all institutions report data on an annual basis); and patchy or non-existent information on flows to (and from) the private sector.

Some interesting initiatives specifically targeted to the private sector by bilateral assistance, working in partnership with MDBs, are presented in the Annex to this paper.

Development Banks

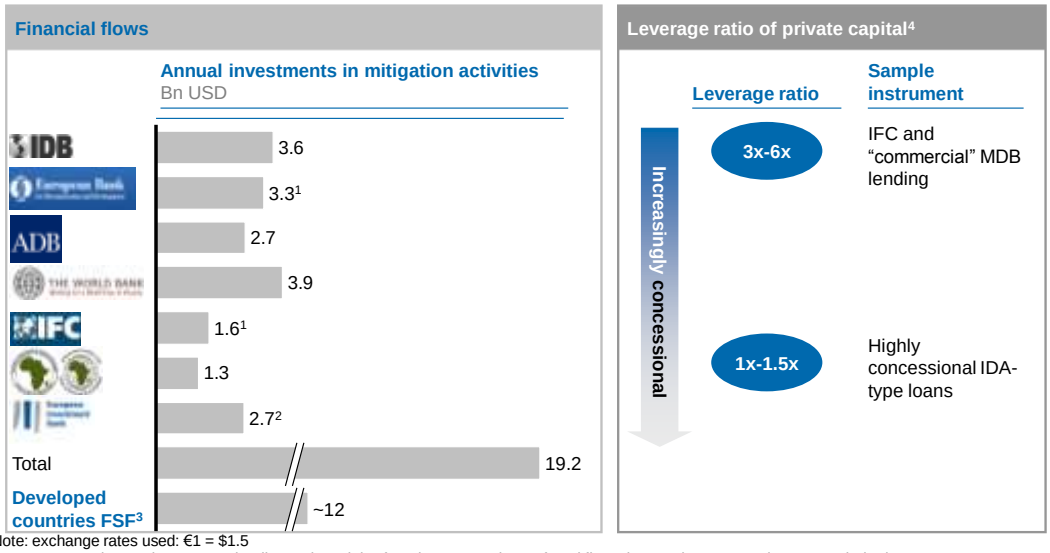
Multilateral development banks (MDBs) and their national counterparts (NDBs) are an important source of finance for climate-related investment in developing countries. MDBs are able to provide tenors that are compatible with the needs of climate-related investment, particularly RE. Annual investment by MDBs in mitigation activities in developing countries amounted to around USD19 billion in 2010, in support of projects worth around USD60 billion (see Figure 5).[24] It is estimated that at least 25% of MDB financing was for private sector projects. Since MDBs tend to play a catalytic role in the provision of finance, they can mobilize multiples of their own financing from other sources.

Data gathered by Bloomberg New Energy Finance (BNEF) indicate that national development banks accounted for USD5.8 billion in clean energy financing in 2010.[25] BNEF defines clean energy as renewable energy, which does not cover energy efficiency, large hydro, or finance to supply chain projects like component manufacture. Wind and bioenergy were the biggest recipient sectors. NDBs covered include Brazil's BNDES, KfW, AFD, China Development Bank, the Indian Renewable Energy Development Agency (IREDA) and the Overseas Private Investment Corp (OPIC) of the USA. Most NDBs are focused on the country or region in which they are based. KfW's focus, for example, is described as being largely European. The share of the private sector in the reported NDB financing is not available, but some NDBs have an explicit mandate of working with the private sector. OPIC has the specific mandate of working with the US private sector to support US investment in emerging markets.[26] BNDES' client base

[22] UNEP 2010
[23] The European Investment Bank is more typically classified as a multilateral development bank, which is also the classification used in this report
[24] Assuming an average leverage of 3 times, and based on estimates of total climate-related investment in developing countries gathered from various published sources and team analysis.
[25] Bloomberg New Energy Finance (2011) *Clean Energy Research Note, The past, and future, of development bank finance to clean energy projects*. April 2011. Bloomberg New Energy Finance
[26] http://www.opic.gov

consists primarily of private companies and entrepreneurs.[27] However, assembling a true picture of financial flows from these institutions to private climate related activity remains difficult. IREDA is said to source more than half its funds from other development banks,[28] so the data presented above may include some double-counting. More work is needed to assemble a true picture of climate-related investment flows attributable to NDBs.

Figure 5: MDB investment and leverage ratios for mitigation, 2010



Note: exchange rates used: €1 = $1.5
1 For EBRD and IFC private sector lending main activity; for other MDBs share of total financing to private sector (separate window)
2 Additional USD 12.5bn in climate change mitigation investments in the EU
3 Part of funds flows through MDBs
4 Leveraged capital can include additional public funds (e.g., local development banks), however except for large renewables very small share
5 Financial data for 2010 only if without remark
SOURCE: GEF, MDB reports, WRI

MDBs often play an "honest broker" role between host governments and the private sector, providing comfort to both sides and enabling investment that might not otherwise have taken place. They can also pass on the de facto immunities such as preferential access to foreign exchange afforded to them by the host country to other lenders within a syndicated transaction. Neither EBRD nor IFC is able to provide concessional financing for its own account, but both have garnered significant experience in channeling concessional financing to climate-related projects, since they serve as implementing agencies of the GEF and, more recently, access the Clean Technology Fund (CTF) to create blended financing packages in support of low-carbon investment in developing countries. Both institutions also manage technical assistance or advisory programs in support of climate-related investment. These activities are described in greater detail in Part C below.

Leveraging public resources with private funds.

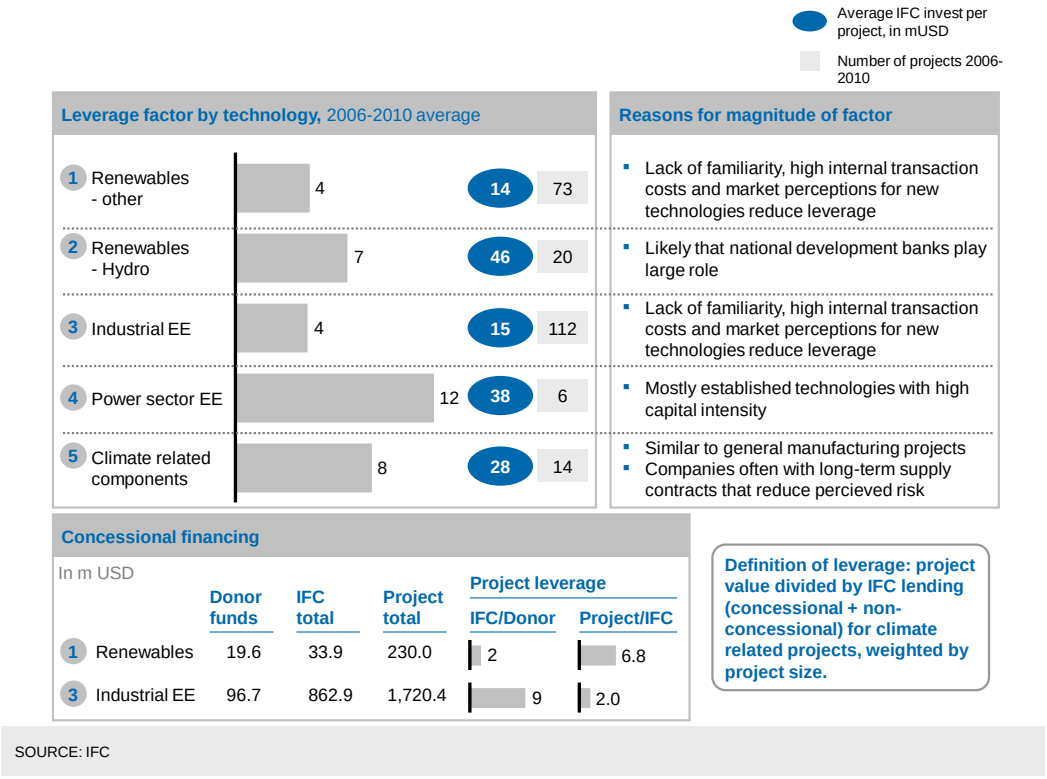
A key element of MDB finance is leverage – defined as the amount of private financing that can be mobilized per dollar of public or quasi-public support.[29]

[27] http://www.bndes.gov.br
[28] BNEF 2011
[29] Definitions of leverage vary, making comparisons tricky. Leverage figures reported in Figure 5 mostly refer to private capital mobilized – which in the case of concessional IDA-type loans may be small, even if the overall leverage for concessional finance may be quite large.

As mentioned earlier, there are very few sources of reliable and consistent data on leverage in private sector climate finance. MDBs active in private sector lending are one such source, with multi-year data sets on low-carbon energy and climate-related finance. CTF is another source, although its recent establishment means that it may not yet have a very large number of private sector transactions from which to draw conclusions.

Both EBRD and IFC have a long history of private sector investment, and data on climate – related investment is tracked by both institutions. Figure 6 and Figure 7 show the average leverage factors derived from EBRD's and IFC's climate-related portfolio, broken down by type of project. The data analyzed cover 353 projects for EBRD and 225 projects for IFC over the period 2006-2010. EBRD's Sustainable Energy Investment (SEI) model involves the systematic provision of TA, provided on a grant basis and funded by donors. IFC's Cleaner Production program also involves the provision of TA, but in the time period analyzed, it was limited to portfolio clients for small incremental investment volumes. Leverage ratios for activities that benefited from some form of concessional finance are also presented. While both institutions have had access to GEF financing, IFC appears to have made greater use of it, but even so, GEF funding has been used in only 8 projects in the timeframe reviewed. Given the relatively recent advent of CTF financing, it is fair to assume that the vast majority of the projects undertaken did not benefit from any special concessional financing regime.

Figure 6: Leverage factors for IFC's climate-related portfolio.



SOURCE: IFC

Leverage factors differ by sector. It is not surprising that they tend to be higher for established technologies and more capital intensive projects, and lower for "newer" activities where informational barriers and other market perceptions may deter other financiers from participating in the financing plan. For IFC, the leverage ratio for "new renewables" (other than large hydro)

and for IEE tends to hover around 4, which not coincidentally approaches IFC's overall financing ratio of 25% for most real sector projects. Relatively high leverage factors are achieved in PEE – essentially because these projects are very capital-intensive and large in size. They are also undertaken with established players and present relatively few technological surprises, and are thus able to attract other sources of finance. In some countries, notably Brazil, NDBs play a very important financing role in such projects. This is also true for large scale hydroelectric projects. IEE, on the other hand, tends to achieve relatively low leverage ratios – an average of 4 based on a sample of over 100 projects. This average figure masks important differences, however: when IEE is undertaken through financial intermediaries, leverage is considerably lower than this average, whereas when IEE in undertaken directly with a client, leverage is higher. In the case of IEE via financial intermediaries, MDB financing is provided as a credit line to the local bank, which onlends the proceeds with a very small additional contribution from own funds.

Component manufacture is in essence no different from any general manufacturing project, and in many cases, the company is likely to have a long-term supply contract or other offtake agreement for the components it manufactures – providing comfort to lenders and reducing the perceived risk of the project.

IFC and EBRD calculate leverage ratios in different ways, although they report on their total climate financing on similar and comparable terms. IFC calculates leverage as the total value of the climate-related portion of a project divided by IFC's pro-rata share of the financing plan attributable to that portion. EBRD calculates leverage as the total value of the project (including the non climate-related portion) divided by the value of the SEI financing.

The leverage associated with EBRD's leverage factors also shows some variability.

Figure 7: Leverage factors for EBRD's climate-related portfolio.

	Project description	Project volume, in m USD				Project leverage	
		Grant	SEI	EBRD	Project	Grant[1]	Project[2]
1 Renewables	▪ Two biomass CHP plants & implementation of EE in adja-cent pellet production plants	0.1	51.6	51.6	64.5	969	1.3
	▪ Enable Renewables lending through direct lending facility	8.5	75.0	75.0	150.0	9	2.0
3 Industrial EE	▪ EE in a sugar production plant	0.6	26.6	54.3	57.9	44	1.1
4 Clean energy production (Power EE)	▪ Refinery EE	0.1	102.0	225.6	721.5	1,028	3.2
	▪ N.a.	0.1	64.2	64.2	406.5	524	6.3
Buildings (Commercial)	▪ Lighting replacement in a furniture factory	<0.1	0.3	0.3	0.3	7	1.0
Municipal EE	▪ Public transport modernization	0.1	38.0	38.0	711.9	338	18.8
	▪ Heating and hot water EE	<0.1	17.6	17.6	17.6	772	1.0
	▪ Gov. Program to fuel industrial and residential EE	-	40.4	40.4	40.4	7	1.0
Other	▪ Enable commercial banks to lend to EE and small-scale RE	9.4	232	232	232	25	1.0

1 Total SEI volume/grant volume
2 Total project volume/EBRD volume
SOURCE: EBRD

But regardless of the differences in calculation methodologies between IFC and EBRD, what emerges from the above analysis is that MDBs lending to the private sector can mobilize significant financing from other sources; that such multiples are higher for the more established technologies and in areas where regulatory frameworks are well-defined; and that judicious use of TA can unlock significant investment opportunity in EE, where market awareness may be low.

C. Concessional Finance

There are typically three main rationales for providing concessional finance to private sector climate investments: (i) market failures, which undermine economic efficiency; (ii) equity or distributional goals, such as promoting affordable access to basic services to under-served people; and (iii) market development or policy goals, such as promoting investment in innovative sectors. The most important market failure in most of the world today is the lack of carbon pricing.

The main market failure relevant to private investment is the existence of public goods or positive externalities, such that the social returns from an investment exceed the private returns expected to be captured by the investor. The market failure could be a result of asymmetrical or imperfect information. These conditions can result in under-investment. The provision of some form of subsidy or other form of special support can help to address this gap and even narrow the gap for future investments through the learning that emerges from demonstration projects.

Beyond questions of market failure, most societies embrace various equity or distributional goals, such as enhancing the affordability of basic services like clean drinking water and education to under-served groups. Targeting, incentive, and financial sustainability issues are usually major considerations in the design of relevant strategies. Output-based aid is one of several approaches for deploying subsidies to meet equity or distribution goals.

Governments may also choose to subsidize certain activities on account of policy imperatives and to incentivize market development. Preferential tariffs for renewable energy, or tax incentives for certain types of investment, are examples of such support.

An increasingly critical role is for concessional finance to absorb the gap in risk-return expectations of the market (private sector). This concessionality is typically provided by the concessional finance taking a small, but more adverse risk-return position in the financing of a program or a project than the private sector, enabling the project to move forward. Such structures hold the promise to unlock large private flows to low carbon investment in developing countries for relatively small amounts of public funds.

Instruments of Concessional Finance

The support conferred through concessional financing can be structured through differences in rate, tenor, security or rank, or a combination of these levers, as required by the project and client to proceed with the project. These levers most commonly apply to debt products, but are also present in guarantees/risk sharing products insofar as those guarantees receive sub-market fees for the risk they cover and are often de facto in a subordinated (rank) position as partial first loss.

Debt products

Concessional debt products can be tailored to address the high cost of early market entrants, and are typically provided to address issues of liquidity, tenor and cost of funds. Concessionality can be linked to the achievement of the desired results through interest rate reductions, longer tenors, or with different rank and security packages (see Box 1).

Box 1: Concessional Debt and Technical Assistance to Enter New Markets

TURSEFF, the Turkish Sustainable Energy Finance Facility, provides a combination of commercial-priced finance with concessional co-finance and substantial TA support to commercial banks in Turkey for on-lending to EE and small-scale RE. The facility will eventually cover five local private banks, and is expected to lead to a total of 160 projects, with abatement of 232,000 t CO_2/ year. The TURSEFF loan package consists of EBRD loans, complemented by concessional financing and TA grant from the CTF, in addition to TA from the EU to support project implementation. The aim of the use of concessional co-finance and grant in this case is to provide an incentive to private sector banks to enter a new market. By reducing the costs of the loans for the banks, the EBRD covers their expenditure in establishing this new line of business. The use of TA further de-risks the market entry, by ensuring that demand for the banks' loan products is stimulated through project preparation by technical specialists and more general marketing. TURSEFF is an element in the CTF Country Investment Plan's strategy for banking sector transformation, which is jointly implemented by the IBRD, IFC, and the EBRD.

Subordinated Debt / Mezzanine Financing

Subordinated or mezzanine debt— financing with a lower (re)payment priority than senior loans—may be necessary to address a combination of risk and cost barriers in the same transaction. This product can be useful to strengthen a project's equity profile and to encourage additional commercial lenders to provide senior debt financing. IFC used concessional subordinated debt to support one of the first wind projects in Mexico (see Box 2).

Box 2: Concessional Debt to Catalyze the Wind Power Market in Mexico

In 2010, IFC used concessional financing from the Clean Technology Fund (CTF) to support one of the first private sector wind farms under the self supply framework in Mexico. In addition to high costs (early market entrants were required to pay for the construction of new transmission lines they would not use and which would benefit future entrants), the sponsor experienced early-market-entrant challenges including an evolving regulatory regime and lack of a sector track record. IFC used a concessional debt product to rebalance the project's risk-reward profile and demonstrate to other investors that such projects could take on more debt than current lenders are willing to take. By providing the project with a subordinated loan with concessional pricing and an amortization schedule that included a deferral mechanism, IFC/CTF was able to (a) help create a financing package that covered approximately 18% of the additional costs the sponsor faced as an early market entrant, (b) promote the creation of a track record which would reduce the perceived risk for future investors, and (d) encourage the continued development of wind projects. This project has already helped demonstrate the viability of wind development in Mexico. While the first CTF transaction to be negotiated was unable to attract commercial banks, the second CTF transaction attracted two commercial banks in the financing plan. There are now a number of large wind developers moving into this space without the need for CTF support.

Guarantee / Risk-sharing Products

When the perceived risks of investing in an activity promising strong environmental or social benefits are the main barrier to investment, concessional funds can be used in a subordinated position for structured products such as partial credit guarantees, risk sharing facilities (RSFs), structured debt funds and securitizations. Client financial institutions pay a below-market fee to receive the benefit of the guarantee coverage provided by the risk sharing facility on a portfolio of assets. The coverage is typically provided to enable the client financial institution to enter into new sectors promising strong social benefits, but where the perceived risk is high, making market based pricing for the first loss tranche prohibitively expensive (see Box 3).

Box 3: Guarantee/Risk Share Products to Promote Development Objectives

The China Utility-Based Energy Efficiency Finance Program (CHUEE), initiated in 2006, supports marketing, development and equipment financing services to energy users in the commercial, industrial, institutional and multi-family residential sectors to implement energy efficiency projects in China. Under CHUEE's risk sharing program, IFC shares a certain percentage of the credit risk in portfolios of loans originated and funded by the partner banks for energy efficiency (EE) related projects. By sharing the risk in the EE loan portfolio, IFC provides comfort to and reduces the risks taken by the partner banks. The first loss portion of IFC and the banks' exposures is protected by Global Environment Facility (GEF) funding. GEF's concessionally priced first loss protection makes the overall risk sharing program attractive for the partner FIs to enter the EE lending market with IFC. In addition, GEF also provided TA for capacity building in local banks. CHUEE is expected to have significant developmental impact in promoting energy efficiency, reducing pollution and greenhouse gas emissions in China. This project was part of an evaluation undertaken by the World Bank's Independent Evaluation Group in 2010 and one of the key findings was the importance to orient the program's subsidy element to the areas of market failure. Three CHUEE programs have now been approved, each one with a lower amount of first loss being covered. As of December 2010, the first 142 sub-projects under the CHUEE programs were financed by USD573 million of IFC loans, backed by risk sharing facilities. The total value of the investments so financed is estimated at USD1.18 billion, with emissions savings of 2.3 m t CO_2/ year. However, the banks have expanded their financing activities well beyond these amounts – with the total value of financing estimated at USD1.7 billion for 200 projects. While it is difficult to attribute causality to any one factor, the fact remains that these results were achieved on the back of around USD26 million of concessional financing.

Equity/Quasi-equity products

While subordinated debt has some of the risk profile of equity, it is primarily a structure that mitigates risk for senior lenders; higher risk-taking equity, on the other hand can encourage developers to accept risks they otherwise would not by sharing in the equity risk. Equity may be needed to support projects that have viable business plans but where sponsors either do not have the financial wherewithal to implement the project alone, cannot persuade institutional investors to participate due to the overlayering of sector specific and developing country risk, or because project sponsors are unwilling or unable to shoulder the full risks associated with entering a new and unproven market. The risk profile of some early stage, highly innovative companies (e.g. cleantech companies) makes the use of even concessional debt inappropriate due to the uncertainty of the size and timing of cash flows.

Technical assistance

In some cases, the instrument required may be technical assistance or project preparation support rather than or in addition to outright finance. Technical assistance and other advisory services may be required to help build the right enabling environment, to promote market awareness among consumers, or to build capacity of local personnel to devise, manage and monitor climate-related policy frameworks. Advisory services often play a key role in disseminating the experience of the early movers that benefitted from concessional finance to other potential market entrants—ensuring an effective demonstration effect. At the project level, technical assistance may be a very effective use of donor resources to create awareness of EE investment opportunities whose main barriers lie with sponsors' lack of awareness, experience, or relevant skill sets. (see Box 4)

Box 4: Technical Assistance to Identify Energy Efficiency Opportunity

Since 2008, EBRD has provided three loans with climate mitigation elements (a fourth one is to be signed this year) to Astarta, a sugar production company in the Ukraine, helping to significantly improve the energy efficiency of the company. The transactions succeeded in combining investment in equipment, training, and carbon finance, and thereby broke new ground in Ukraine. The repeat transactions show the power of energy audits in uncovering savings potential. All the loans are given at market-equivalent interest rates, with no subsidy element. Climate finance was market-based, through carbon market transactions. The only use of donor funding was in the provision of energy audits. This amounted to USD150,000 in total – and resulted in loan financing of USD54.3 m, including USD26.6 m of EE measures identified through energy audits commissioned by the Bank. The energy savings resulting from the upgrade and modernization of equipment and heat supply systems brought the energy intensity of Astarta's business considerably closer to EU standards. Part of the 60,000 t CO_2 savings realised by the investment were purchased by participants of the EBRD/EIB Multilateral Carbon Credit Fund. In order to increase the management capabilities in relation to EE, a grant funded Energy Management Training was carried out for 20 Astarta engineers and specialists in 2008. This will reduce reliance on externally funded consultants in the future, and ensure that Astarta will continue to pursue EE opportunities within its business. Grant support for the implementation of Energy Efficiency Management Systems through the EBRD's Shareholder Special Fund was also provided**.**

EBRD's Sustainable Energy Initiative (SEI) was launched in 2006 and provides a unique combination of RE and EE investment finance, carbon finance and donor funds for TA and (feasibility studies and energy audits) and investment grants (to address specific market barriers). The transfer of skills to the local market is one of the long-lasting benefits of this program, as financial institutions and the engineering community in the host country become familiar with international best practice. To date, 369 projects have been financed in 29 countries, with SEI investment of EUR6.6 billion in support of total project value of EUR35 b, and expected reductions of 39.6 m CO_2/year.

Leverage in the Context of Concessionality

A review by the Independent Evaluation Group (IEG) of the World Bank Group's carbon finance and climate change activities[30] discusses examples of leverage for low-carbon energy. According to the IEG, leverage is the product of: (a) the *change* in project resources mobilized by the instrument concerned and (b) the *additional returns* (including global benefits) to the

[30] IEG (2010). *Climate Change and the World Bank Group, Phase II. The Challenge of Low Carbon Growth*. 2010. World Bank, IEG/CC2. Also, draft note on *Lessons from evaluation for the design of the Green Climate Fund*. 2011. World Bank/IEG

mobilized funds, relative to their use in the absence of the instrument. The concept of "net" flows, evoked in the AGF report, also reflects a similar, though complementary sentiment. The AGF define "gross" flows as the total amount of private finance made available, and "net" flows as the value of the lower return that investors are prepared to accept on account of any risk-mitigation that they receive through public or quasi-public support (concessional finance, for example, or MDB loans). Both IEG and the AGF recognize that not all instruments that "crowd in" private capital (such as carbon offsets) do so in a way that reduces expected required return.

IEG further points out that a central problem for low-carbon energy investments is the need for relatively large amounts of up-front capital, together with the need for investors to be confident in long-term promises to buy power or repay loans. IEG's finding - that the ability of the World Bank and IFC to make long-tenor loans is an important source of leverage, though the leverage ratio is relatively low – is equally applicable to all MDBs. A fifteen year loan makes it much more feasible to meet debt service coverage requirements than a typical five year commercial loan. Moreover, the demonstration effect can be transformative if local banks were initially excessively risk-averse. IEG/CC2 also concludes that demonstration projects can resolve uncertainty about technical and financial feasibility. By doing so, they can increase investors' willingness to invest in an entire class of projects, rather than just a single venture.

Under the CTF and other concessional finance managed by IFC, the principle of "minimum concessionality" is employed, reflecting the idea that the subsidy included in concessional financing should be no greater than necessary to induce the intended investment. This approach seeks to accelerate transformation of nascent markets, and reduces the potential for market distortions. It also seeks to maximize the leverage of the resources available to fund subsidies. Determining the minimum level of support requires an evaluation of the individual market and the barriers inhibiting investment. This can be a complex process to operationalize when trying to catalyze underdeveloped or absent markets, where there are no obvious price signals. In some cases, it may be feasible to use competitive bidding to elicit market information, such as when rival firms are invited to bid for projects on the basis of the least subsidy required. Where competitive bidding is not feasible, commercial negotiations will be required, informed by relevant market benchmarks. Where markets are in their infancy, flexibility and course correction should be designed into the approach to avoid market distortions and over-subsidizing, but also to respond to signals and move the market to achieve the objective of the concessionality. To support effective market transformation, the level of subsidy provided to successive investments in the same market is usually reduced progressively to facilitate transition to financing on full commercial terms.

Similarly, EBRD has defined a set of principles to ensure appropriate use of subsidies and avoid distortionary impacts, particularly relevant in the area of concessionally priced debt instruments which could have secondary impacts on financial markets.

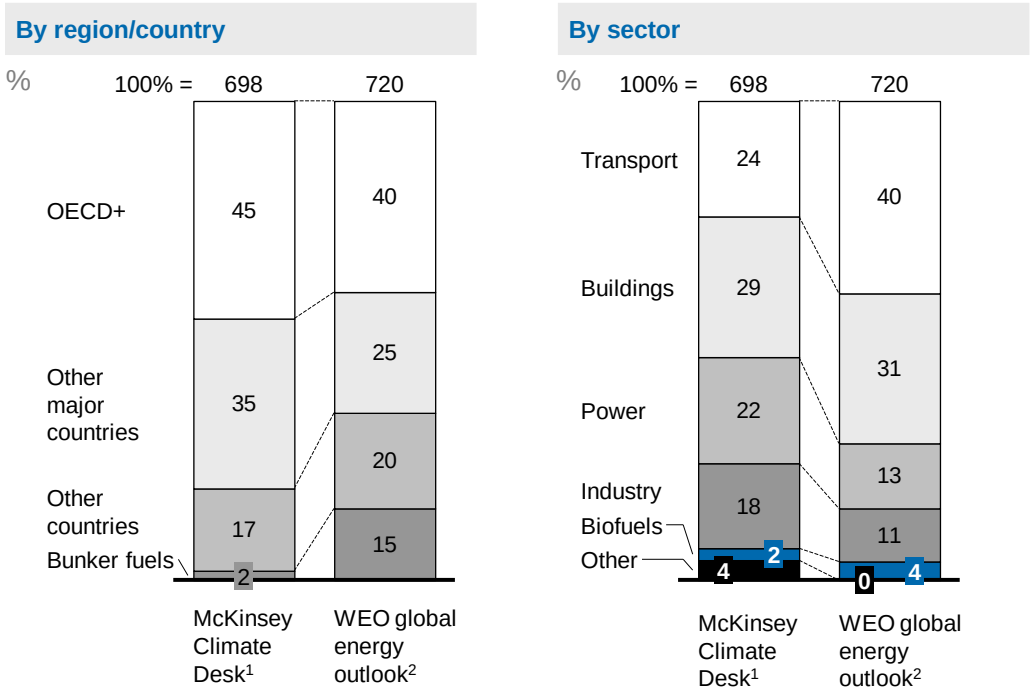
The subsidies embedded in concessional finance might take one or a combination of several forms: the pricing of debt instruments; the sub-market return expectations of equity investments; or the concessional terms of guarantees/risk sharing products. The approach followed to date has been to tailor the most appropriate way of structuring the subsidy to the particular barriers inhibiting the investment.

TA, although usually provided on a grant basis, is not generally seen as a subsidy to the provision of commercial finance.

Section 5. Investment Required for a 2°C Pathway

In order to gauge investment needs for a 2°C pathway, two sources of data were analyzed and compared. The first is from McKinsey & Company's Climate Desk for the 2016-2025 timeframe.[31] The second is from the World Energy Outlook.[32] Figure 8 shows the projections by region and by sector. Given the various factors and uncertainties inherent is such forecasts, it is reassuring to find that both sources come to a similar conclusion in overall magnitudes of financing required, albeit with different sectoral breakdowns. The data include both public and private sector investment. At the present time a breakdown between the two is not available.

Figure 8: Investment needs for a 2°C pathway (USD billion, annual average investment)



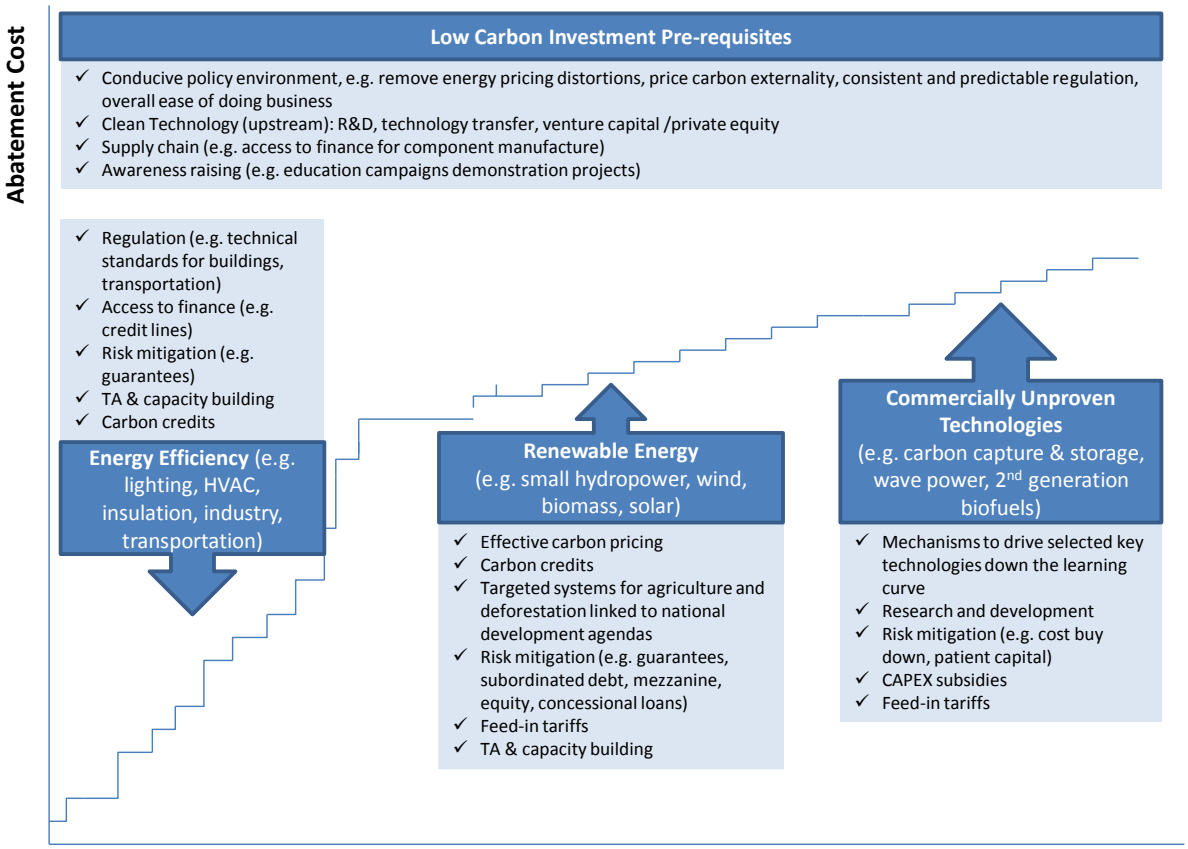
1 Annual average investment based on 2016-2025 total investment
2 Annual average investment based on 2010-2035 total investment
3 Total market size includes capex and electricity sales; total capex in 2020 estimated at USD 1.5 trn. HSBC power sector includes USB 544bn (24%) renewables and USD 368bn (16%) nuclear

McKinsey's estimates are based on the assumption that emissions need to be reduced by 14 Gt in 2020 relative to baseline emissions of 58 Gt, which in turn is estimated to be required in order to limit global temperature rise to 2°C. A 450 ppm pathway with overshoot, with a 50% probability of limiting temperature rise, is used. The abatement mix prioritizes the different abatement measures according to their cost effectiveness, which may not be borne out in reality. WEO's forecast is also based on their 450 ppm scenario, and is provided as total investment needs over the 2010-2035 period, with annual investment needs derived by dividing by the number of years. Although McKinsey's forecasts are available for 5-year periods, for comparability with WEO, the relevant forecasts for the same timeframe were aggregated and similarly divided by the number of years to arrive at an average figure. This is a grossly simplifying assumption; a more likely scenario would incorporate investment ramp-up.

[31] McKinsey Abatement Cost Curve 2.1
[32] International Energy Agency (2010) *World Energy Outlook*. 2010. Paris: OECD/IEA

Regardless of the actual numbers, it is clear that investment needs for mitigation are significant compared to current investment flows. What will it take to mobilize private sector financing around these needs? Figure 9 attempts to map out the financial instruments and support mechanisms that will be needed for different project types, juxtaposed on a stylized version of the familiar McKinsey abatement curve, and based on MDB private sector lending experience to date. This chart reiterates the underlying message of this paper: that mobilizing private investment in low-carbon activities will need a combination of conducive policies and tailored instruments to mitigate perceived risk.

Figure 9: Stylized Marginal Abatement Cost Curve



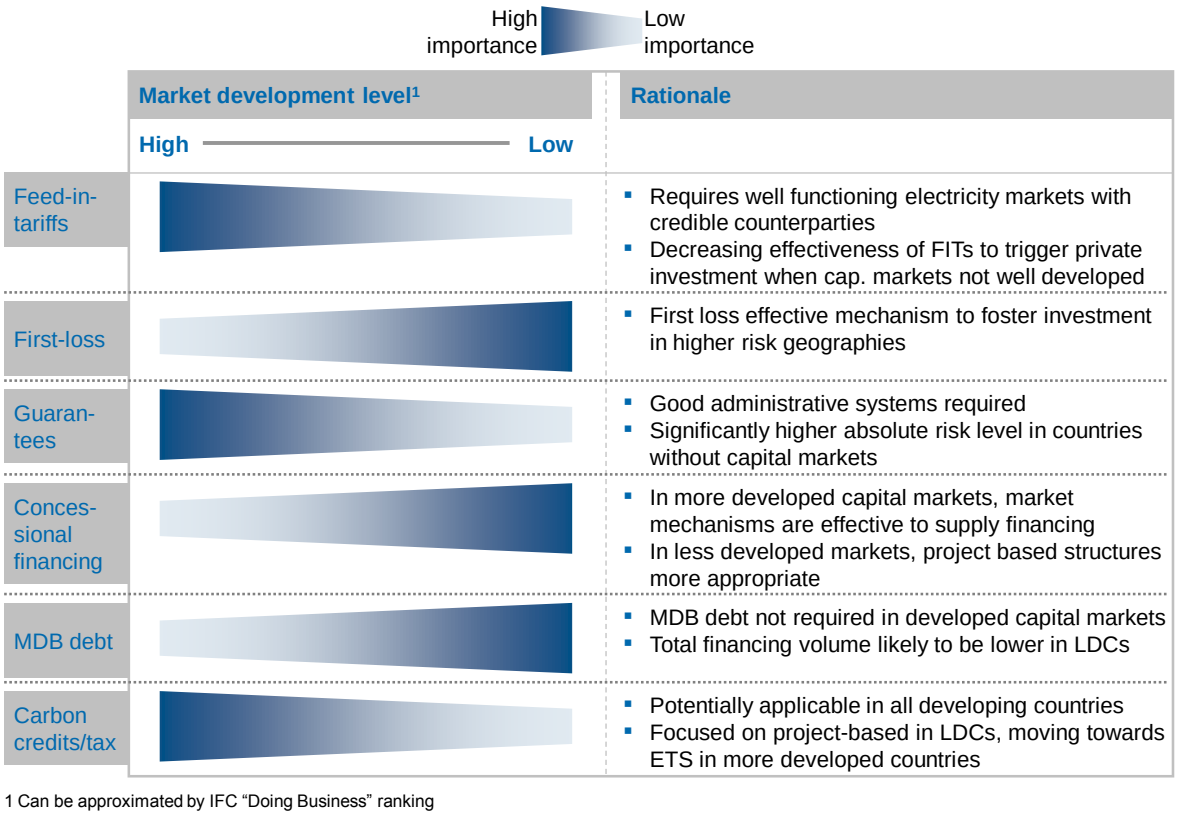
Source: Adapted from Pathways to a Low-Carbon Economy, Version 2 of the Global Greenhouse Gas Abatement Cost Curve, McKinsey & Company, 2009

One size will not fit all, and the solutions will differ from country to country. Figure 10 examines some of the instruments that could be used to promote private investment, and maps their relevance based on overall market development. Market development embodies many things – ease of doing business, rule of law, capital market development, vibrancy of the private sector.[33] Relatively sophisticated instruments such as feed-in tariffs presuppose a conducive regulatory framework and reasonably well-developed capital markets. Instruments like first-loss cover are less likely to be needed when markets are well-developed and information and other barriers to

[33] World Bank Group *Doing Business 2011: Making a Difference for Entrepreneurs* 2011 discusses some of these factors and provides a ranking of countries based on the overall ease of doing business.

investment are low. In contrast, for guarantees to work effectively, a well-functioning domestic financial sector is needed. Developing countries with a high degree of market development will be able to attract many sources of finance, with limited MDB support needed; similarly, concessional finance may be less needed in markets where market mechanisms are able to mitigate risk. Nonetheless, as discussed in Section 4, low carbon investment may still present risk-return gaps which will need some degree of MDB and concessional finance support.

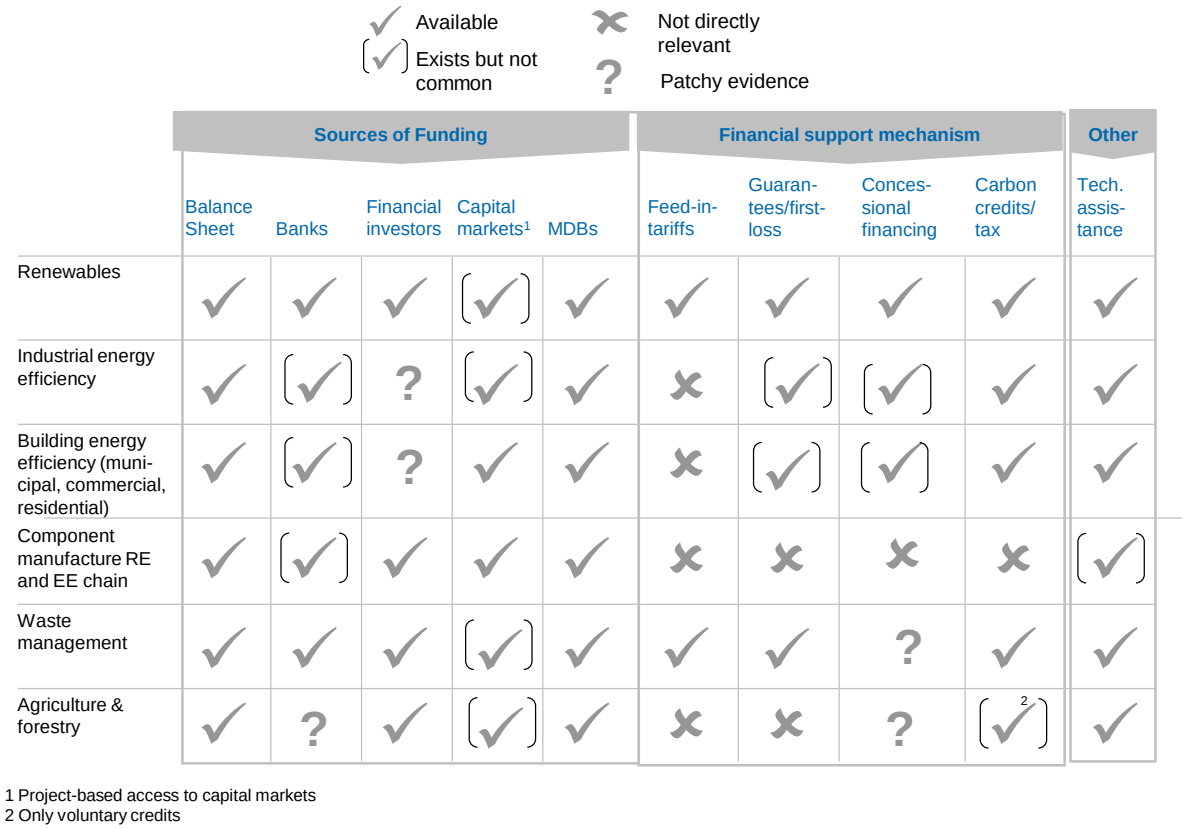
Figure 10: Appropriate mechanisms differ by country



1 Can be approximated by IFC "Doing Business" ranking

The appropriate mechanism will also vary by sector. The chart below attempts to tie the various analyses together based on the MDB experience described above to provide an indication of the state of play today and to suggest a road map of the sources of funding and types of support mechanisms that will be needed to incentivize private sector investment by major project type. What will need to be explored, for each country and market, is whether these sources of funding and support are available, and if not, what needs to be done to unlock them.

Figure 11: Appropriate mechanisms differ by sector



What does this mean for governments, the private sector, and concessional climate finance?

- The private sector will invest where it receives an adequate return for the risk it bears in the underlying project activity. This risk is a function of myriad factors - perceived investment climate, policy stability, pricing signals, to name a few.
- Many of these risks can be mitigated by the market; however, if there is a gap in financing or if the cost of mitigation becomes too high, the private sector will not invest.
- Governments can create a welcoming investment environment through overall policies geared to the ease of doing business.
- In addition, and in order to promote low carbon investment, governments need to provide the appropriate policy framework; some of the instruments available are discussed in the paper.
- A carbon price and sustained carbon markets will provide the revenue enhancements that some emissions reducing projects need in order to generate the returns required to compensate the private sector for the risks involved.
- In the absence of such a price and market, judicious use of public financing will be required to catalyze private sector investment.
- Public financing includes both TA and concessional finance.
- Approaches to allocate concessional finance are being developed, notably under the CTF. In order to encourage the creation of a robust pipeline of deals by project developers and investors, it will be necessary to provide ex-ante indications of how such concessional finance will be deployed.

ANNEX: Interesting initiatives

OECD – policies to promote investment in green growth: Recognizing the importance of policy in attracting private domestic and foreign investment, the OECD assists countries in evaluating the quality of their policy framework through its Investment Policy Reviews. In response to growing demand from countries for policy advice on how to mobilize more green investment the OECD has started analyzing countries' "green" investment policy frameworks in a special chapter of the Investment Policy Reviews. The analysis of green investment in a domestic policy context is structured around the following areas: regulatory policy framework; institutional capacity; investment incentives; policies for public-private partnerships for infrastructure; promotion of responsible business conduct.

OECD work is developing *good practice guidance for policies to promote investment in climate low carbon growth.* It is drawing on lessons from both developed and developing countries to considering the design and implementation of international and domestic policies that trigger private investment in climate protection. For example a recent review of renewable energy investment support policies in OECD countries[34] considers how public support can stimulate private investment in immature clean technologies. In a further example, KfW experience to promote investment in energy efficient renovation in the built infrastructure sector in Germany is relevant as is experience with German International Climate Initiative to support action on climate change in developing countries. The project is also drawing on background analysis at country level for the "green investment" chapters as noted above, working with selected developing countries in that context (e.g. Colombia and Tunisia). Finally it will draw on other in-country lessons and experiences (e.g. ongoing work from the Capital Markets Climate Initiative led by the UK government and the World Economic Forum to examine green investment opportunities and challenges in a selection of different developing countries).

OECD - attracting institutional investors to infrastructure investment: Recent OECD work[35] also examines how pension funds, along with other institutional investors, potentially have an important role to play in financing green growth initiatives. The broad mass of pension funds will be more interested in lower risk investments which provide a steady, inflation adjusted income stream – particularly where investment or solvency regulations require a relatively conservative approach to investment. Pension fund assets can therefore be expected to be directed more towards this type of green project. As such, pension funds already invest in fixed-income securities and there has been appetite for investing in the emerging asset class of green bonds (discussed earlier in the paper).

However, despite the interest in these instruments, pension funds' asset allocation to such green investments remains low. This is partly due to a lack of environmental policy support, but other barriers to investment include a lack of appropriate investment vehicles, regulatory disincentives and lack of knowledge, track record and expertise among pension funds about these investments and their associated risks. To tap into this source of capital, governments have a role to play in ensuring that attractive opportunities and instruments are available to pension funds and institutional investors.

[34] Kalamova, M., C. Kaminker and N. Johnstone, "Sources of Finance, Investment Policies and Plant Entry in the Renewable Energy Sector", 2011, OECD Publishing, Paris.

[35] Adapted from Della Croce, R., C. Kaminker and F. Stewart (2011, forthcoming), "The Role of Pension Funds in Financing Green Growth Initiatives", OECD Publishing, Paris

The OECD paper referenced above examines some of the initiatives that are currently under way around the world to assist and encourage pension funds to help finance green growth projects. It is drafted with a view to inform current OECD work on engaging the private sector in financing green growth. Different financing mechanisms are outlined, and suggestions made as to what role governments in general, and pension fund regulatory and supervisory authorities in particular, can play in supporting pension funds investment in this sector. The paper concludes with the following policy recommendations: *provide supportive environmental policy backdrop; create right investment vehicles; support investment in green infrastructure; remove investment barriers; provide education and guidance to investors; improve pension fund governance*.

AfDB Sustainable Energy Fund for Africa: The Sustainable Energy Fund for Africa (SEFA) is a product of the Danish-initiated Africa Commission (AC), conceived in 2009 to support energy provision to small and medium sized enterprises (SMEs) in Africa in order to stimulate economic growth and increased employment. SEFA is housed at the AfDB, and its focus is promoting renewable energy resources through addressing some of the major obstacles including access to finances. SEFA is expected to leverage considerable additional financing in the sustainable energy sector. SEFA is divided into two activity components. The first component provides grants to offset project preparation costs for renewable energy projects in the size range of USD30-75 million, corresponding to outputs between 20-50 MW depending on the technology employed. These projects will include grid-connected electricity generation utilizing wind, hydro, geothermal, bio fuel or waste incineration power, and can also include energy efficiency. The second component provides direct equity investments to projects with total investment needs between USD5-30 million; the target investment size is between USD10-30 million with some allocation possible to projects in the USD2-10 million range. SMEs receiving investment from component two produce, distribute or enhance efficient use of sustainable energy on a smaller scale than the projects supported under component one. Through both components, SEFA provides additional resources necessary to bring projects that are otherwise unviable to bankable while simultaneously allowing the AfDB to overcome its own economies of scale to reach out to SMEs engaged in energy efficiency.

IFC Global Climate Debt Initiative (GCDI): The project is to establish a $1 billion debt facility that offers senior and mezzanine debt to climate-friendly projects financed by IFC. The objective of GCDI is to mobilize funds from a new class of institutional and private investors, development financial institutions (DFIs), and governments for co-financing climate projects financed by IFC with reasonable risk-adjusted returns. Funds from DFIs and donor governments will be subordinated to those provided by the private sector and the concessionality provided by donor government will be utilized to balance the risk-reward for private investors, and deliver financing to project at a an overall reasonable cost of capital. The target projects to be financed by GCDI are renewable energy and energy efficiency projects worldwide including countries prioritized by IFC.

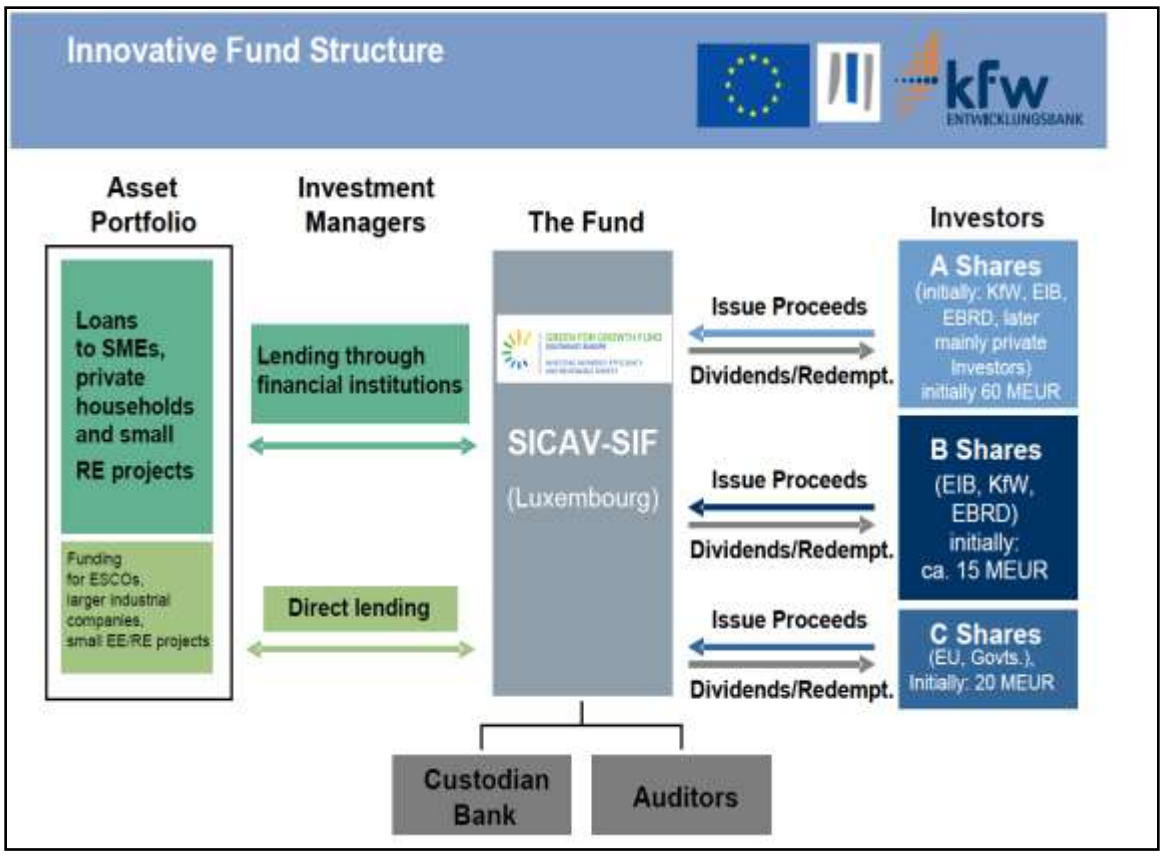
IFC Monetization of future carbon revenues for EE projects: IFC is exploring financing very small and dispersed energy saving project activities can use a new programmatic approach under the Clean Development Mechanism (CDM). A project is under discussion for a large scale residential lighting program to replace incandescent lamps (ICLs) with high quality compact fluorescent lamps (CFLs) in India. Providing long tenor financing to such small, dispersed energy efficiency activities requires innovative structuring around knowledge and experience of the carbon markets. This project is therefore a good fit with IFC's mandate to develop and deploy new financial products. IFC's long tenor innovative financing to a project that has no fixed assets and that depends substantially on carbon credits for revenues can provide positive signals to project developers at a time when investments in such climate-

friendly projects are stagnating due to market uncertainties. Successful financing and implementation of this project may be an important signal for other such projects in India as this is one of the first such projects under the Bachat Lamp Yojana being promoted by the Government of India through its Bureau of Energy Efficiency. Programmatic CDM projects could be a important segment of the carbon market if such projects are able to attract commercial financing based on structures that allow for aggregation and scale-up.

IFC Post-2012 Carbon Facility: IFC launched the IFC Post-2012 Carbon Facility in February 2011 and by final closing in June has €150 million to purchase carbon credits to help reduce greenhouse-gas emissions, extend carbon markets, and increase access to finance for projects that promote environmentally friendly economic growth. IFC will invest up to €15 million in the new fund and mobilize the remainder from European power utilities and energy companies. The facility will forward purchase CERs that are expected to be produced from 2013 to 2020, from projects either directly financed by IFC or by local banks financed by IFC. The facility will provide a longer-term high-quality carbon revenue stream and increase financing options for projects that reduce emissions.

EIB - The Green for Growth Fund, Southeast Europe (GGF SEE): GGF SEE is the first fund to specialize in supporting EE and small scale renewable energy RE projects in Southeast Europe, including Turkey[36]. In line with the European Union's 20/20/20 target, its aim is to achieve in the area a 20% reduction in energy consumption and/or a 20% reduction in CO_2 emissions by the year 2020. GGF SEE was jointly initiated[37] by the European Investment Bank (EIB) and KfW Entwicklungsbank (KfW) as an innovative public-private partnership (PPP) established to reduce energy consumption and CO_2 emissions in the region. GGF SEE primarily provides refinancing to local FIs to support and eventually enhance their participations in the EE and RE sectors. It can also make direct investments in Non-Financial Institutions such as ESCOs and suppliers of RE and EE equipment goods and services. As of 31st December 2010, the total amount from investors reached EUR 128 m.

[36] In total Albania, Bosnia & Herzegovina, the FYR of Macedonia, Kosovo, Montenegro, Serbia and Turkey.
[37] as a closed-ended investment company 'société d'investissement à capital variable' or SICAV under the laws of the Grand Duchy of Luxembourg; launched December 2009



GGF SEE has been structured as a layered risk/return fund: it can leverage donor funds[38] in the form of a junior-most tranche (first-loss 'C-shares'), enjoys the support of international financial institutions[39] (IFIs) which could absorb losses exceeding the C-shares amount in taking up a mezzanine tranche ('B-shares') and facilitates investments from risk-averse public and private capital investors ('A-shares' and Notes). It can, indirectly through FIs, offer a broad palette of financing instruments (including medium to long-term senior loans, subordinated loans, syndicated loans, letters of credit, guarantees, diverse mezzanine debt instruments with possibilities of local-currency denominated securities) to be on-lent to households, SMEs, large businesses, municipalities, public sector entities or to small scale RE. A parallel TA facility, supported by a significant number of donors,[40] provides support to the fund's beneficiaries, including capacity building in the implementation and long-term effectiveness of the financed investments and monitoring and reporting processes for the measurement and validation of energy savings and CO_2 emission reductions.

In February 2011, the European Energy Efficiency Facility or EEE-F, a similar structure that will be able to operate across the overall EU27 states, has been set up by the Member States and the European Commission. EEE-F is endowed with EUR145m from the European Energy Programme for Recovery that was mobilized during the 2009 crisis: EUR125m will be available as C-shares and EUR 20m for technical assistance. The EIB will invest up to EUR75 million particularly in B-shares, resulting in an initial fund volume of at least EUR200m. Other financial

[38] particularly the European Investment Fund (EIF) as trustee (but also custodian) for the European Commission
[39] particularly the EIB, KfW and European Bank for Reconstruction and Development (EBRD)
[40] particularly the German Federal Ministry of Economic Cooperation and Development (BMZ), Ostereichische Entwicklungsbank (OeEB), the Development Bank of Austria and the European Commission

institutions at Member State level have been invited and could also join EEE-F. The objective is to launch it in the second quarter of 2011. Its final size will depend on additional investors (public but also private) and the eventual investment portfolio.

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