Meeting the Climate Challenge: Using Public Funds to Leverage Private Investment in Developing Countries

Section 4 – Spending public finance to leverage private investment: specific instruments for specific challenges

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Summary

Public intervention to raise funds on the capital markets for climate change mitigation and adaptation addresses only one (albeit significant) issue of the climate financing challenge. The methods of **spending** the money raised through the capital markets or collected via other means (such as taxation, auctioning of emission rights etc) in a way which maximises the private financing leverage are equally important. This section, consequently, looks at the specific instruments that Governments could deploy to ensure increased financial flows into specific climate investment areas, namely: low-carbon energy and technology; energy efficiency; forestry and adaptation.

A number of significant findings emerge from the section. Firstly, the section confirms that **all three types of financial spending**– purely public transfers for technical assistance and capacity building; public-private financing instruments, whereby limited public resources are used in a way which maximises the leverage of private finance; and private investments which are not reliant public finance are going to be important to catalyse investment into climate mitigation and adaptation. It will be necessary to ensure that **the benefits of each type of spending are maximised**. For example, the section shows that in some areas of climate financing significant private sector investment is already possible (e.g. in forestry) and/or will occur by default (in the case of some types of adaptation investments). In such circumstances, it will be important to ensure that public resources are not used unnecessarily to avoid substituting for, or crowding out private sector investment that would otherwise occur, targeting areas where public assistance is not needed, or providing unnecessarily high levels of support. On the other hand, where investment is failing to occur at the scale necessary (either due to the perceived riskiness of the types of investments, market barriers or lack of information), purely public finance aimed at providing technical assistance and capacity building, and targeted public-private mechanisms will need to be deployed to bridge the investment gap. Although the focus of

this section is on the second category of financial spending (namely, the public financing mechanisms (**PFM**s) aimed at leveraging private finance), contributors have also referred to other types of financing mentioned above as important means of supporting the climate investments.

Secondly, what emerges from the section is that **effective policies and regulatory frameworks** will be critical to support and maintain the investments which can be made through the use of traditional PFMs such as concessional debt or risk mitigation instruments in the long run; in the absence of such policies and regulatory frameworks, any investments that could be leveraged through the mainstream PFMs will underdeliver and be unsustainable.

Thirdly, although the main focus of the section is on policies and instruments for leveraging private financing **at the national or sub-national levels**, contributors highlight the importance of **international policies and mechanisms** (such as, for example, creation of market-based instruments such as carbon markets, or establishment international funds) as playing a similarly significant role in mobilising private finance.

Fourthly, it is clear that the **majority of public financing mechanisms** aimed at leveraging private sector financing and surveyed in this section, have been **used successfully in the past**, and continue to be used in areas such as infrastructure investment and project financing. Such instruments can be adapted to the specific requirements of climate investments, and can be deployed at scale and efficiently, using enhanced institutional arrangements. However, this focus on operating within the current investment constraints and frameworks (rather than developing innovative proposals and mechanisms) may also relate to the investors' lack of trust in the Governments' ability to put in place the climate change regulatory frameworks both at international and national levels, and therefore their reluctance to factor in potential new revenue streams (e.g. from the carbon markets) and innovative financing mechanisms into their decision making. In addition, the constraints created by the current financial crisis clearly contribute to enhance risk aversion.

Tackling climate challenge will necessitate a departure from the status quo and consequently calls for a **deep and systematic dialogue** between the private sector and policy makers, which should result in innovative and scalable financing solutions. Building on the expertise and experience evidenced in this section, public-private partnerships should take up the recommendations set out below and ensure they translate into a new and unprecedented shift in the current investment patterns.

4.1 Financing clean energy and low-carbon technologies

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4.1.1 The challenge

Addressing climate change will require a rapid transition to a low-carbon energy mix if countries are not to be "locked into" old technologies such as coal-fired power generation, which are still being deployed. Decarbonising the energy sector will require both a **scaled-up deployment of existing technologies in the near-term**, as well as the **development, demonstration and deployment of new technologies in the mid to long term**.

Different technologies are in different stages of the technology cycle, which covers innovation, development, demonstration, deployment and diffusion.

Existing technologies *Commercially operating*	**New technologies** *In development, demonstration and early-stage deployment stages*
• On-shore wind • Small hydro • Geothermal • Various forms of solar and bioenergy • Hybrid vehicles in the transport[1] sector	• Offshore wind • Advanced solar • Plug-in hybrid and electric vehicles • Second generation biomass • Wave and tidal • Carbon capture and storage

Most clean energy technologies are still relatively high cost when compared with conventional high carbon options if environmental and other externalities are not factored in. Therefore, without the necessary incentives to create markets for clean energy technologies, including a sufficiently high price on carbon, there is little first mover advantage for commercial actors to drive their early uptake. **Carbon pricing should eventually make these technologies competitive, but probably only in the mid to long term**. In the meantime, a variety of other policies and incentive schemes, as well as PFMs aimed at mobilising scaled up private sector investment will be required to improve the economics and help investors mitigate the risks associated with early engagement. As low-carbon technologies move down the learning curve, their costs should decrease, accelerating uptake and opening up substantial mitigation potential.

[1] Hybrid vehicles also offer valuable energy storage that will be necessary as more intermittent power generation resources are deployed. Research and development into advanced batteries will be critical.

4.1.2 The investment profile

The low-carbon energy and technologies sector is characterised by:

- high upfront costs, as explained above;
- in the case of the energy sector, steady revenue streams from energy off-take, as well as (in certain cases) additional income from the carbon markets and/or other public support mechanisms such as feed-in tariffs;
- high unmet demand, particularly in the developing countries.

4.1.3 The role of the private sector

The private sector has a key role to play in developing and deploying low-carbon technologies. This includes:

- technology **innovation**;
- **supply** of the relevant technologies to the market at scale (very often the innovator and the supplier will be the same entity, but this is not always the case);
- provision of **project financing** for the deployment of the technologies;
- creating **demand** for the low-carbon technologies.

4.1.4 Risk profile

A wide range of risks are at play in the clean energy sector, some of which are sector specific and some of which are common to all infrastructure developments. The key risks include:

- **Strategic risk,** which includes technological change, shifting consumer preferences, or other events that may negatively impact the performance of market players. This risk is a consideration across technology development, demonstration and deployment.
- **Operational risk,** which includes interruption of service due to system errors or defects. This risk is a consideration across technology demonstration and deployment.

- **Financial risk,** which includes financial loss due to interest rate movements, currency fluctuations, oil price volatility, input cost changes, counterparty credit issues and decommissioning costs. This risk is a consideration across technology demonstration and deployment.

- **Political risk,** which includes changes in the political or regulatory landscape that may harm performance of technologies, especially with regard to the policy framework that delivers a carbon price or revenue support mechanism. This risk is a consideration across technology development, demonstration and deployment.

- **Physical risk,** which includes financial loss due to adverse weather events. This risk is a consideration across technology demonstration and deployment.

These risks often manifest themselves differently for each technology (See **Figure 1** below).

Figure 1 - Key risks by technology

	Risks				
	Strategic	**Operational**	**Financial**	**Political**	**Physical**
Offshore wind	Technology risk – early movers may lock in cost-disadvantaged assets	Repairs to offshore assets will be expensive and time-consuming	Electricity and oil price volatility, currency exposure and counterparty credit add risk	Seabed law, renewable standards and transmission permitting rules are subject to change	Wind variability and storms can reduce output or damage plant
Onshore wind	Technology risk – later movers may be able to deploy even lower-cost equipment	Repairs to plant can be expensive and time consuming due to the need for specialized cranes	Electricity and oil price volatility, currency exposure and counterparty credit add risk	Renewable standards and transmission permitting rules are subject to change	Wind variability and storms can reduce output or damage plant
Solar	Technology risk – early movers may lock in cost-disadvantaged assets	Transmission infrastructure to remote parks may underperform	Electricity and oil price volatility, currency exposure and counterparty credit add risk	Solar potential exists where political systems may be less developed	Adverse weather can reduce output
Hybrid vehicles	Infrastructure base is not in place for early adopters	Additional vehicle components (e.g. extra fuel source) add risk to system	High initial capital costs increase exposure to interest rate risk	Deployment of key infrastructure is subject to political support	Not a significant additional risk factor
Biomass	Some questions over sustainability persist	Additional plant in cogeneration facilities (e.g. gasifiers) adds risk to system	Feedstock and oil price volatility, as well as currency exposure, add risk	Land ownership rights for sourcing feedstock may be unclear in some jurisdictions	Adverse weather can reduce output
Carbon Capture and Storage	Technology risk – early movers may lock in cost-disadvantaged assets	Additional plant (e.g. scrubbers) adds complexity and risk to system	Additional feedstock costs to run CCS systems add risk, while leakage risk drives up insurance costs	Essential early-stage subsidies are subject to change and may not be sufficient	Not a significant additional risk factor
Geothermal	Investment in exploration may not result in a usable asset	Not a significant additional risk factor	Electricity and oil price volatility, currency exposure and counterparty credit add risk	Regulation by a number of agencies at different levels of government adds risk; country risk also exists for some resources	Not a significant additional risk factor
Small hydro	Not a significant additional risk factor	Variability in water speed can compromise frequency stability of power fed onto grid	Electricity and oil price volatility, currency exposure and counterparty credit add risk	Many of these installations exist – and much potential remains – where political systems may be less developed	Susceptible to damage from storms and flooding or shut-down in case of drought

Source: Deutsche Bank Group Analysis.

Across these five dimensions, **low-carbon energy technologies may face higher risks when compared to conventional options** for three reasons:

- The technologies are subject to extensive timing uncertainty across the development, demonstration and deployment stages, increasing strategic and financial risk.

- In demonstration and deployment, the technologies are more financially **vulnerable** than their conventional alternatives to variations in weather, changes in political

support, and operational failure due to system complexity, accentuating their physical, political and operational risk.

- The technologies are generally more capital intensive, increasing the financing requirements and therefore the financial risks involved.

Because of the increased vulnerability of these technologies to risk and the longer timeframe over which these risks are experienced, **targeted public sector interventions to support the development and deployment of low-carbon and clean energy technologies will need to be designed** with care to minimise risk. Of course, in light of changing political realities, it is impossible to fully mitigate political risk. There are some mechanisms offered by home governments and the development community that address political and other non-commercial risks in the developing world; but while some initial forays have been made into covering commercial risks, efforts remain insufficient to address all the risks outlined above. New risk-sharing approaches are needed, and those that work need to be scaled-up.

4.1.5 Stages of technology development

It is important to remember that what will work for unlocking private funding for solar is unlikely to be the same remedy needed for carbon capture and storage, as these **technologies are in different stages of development, demonstration and deployment and pose different risks**. While solar is already being deployed, carbon capture and storage is still in the development and early demonstration stage. Costs obviously remain - and will continue to remain - high for carbon capture and storage, yet the technology presents much promise for cost-efficient mitigation**. A portfolio approach should therefore be adopted to reward innovation and spur technology deployment**. While no single technology should be favoured, care should also be taken when crafting the portfolio of incentives to avoid creating path dependency on a set of technologies, while ignoring others with significant long-term potential.

Special approaches will need to be developed for technologies in the pre-demonstration stage. A funding gap arises as technologies move out of the laboratory, creating a **'valley of death'** that hinders technology innovations from getting to and through the demonstration stage. Although the technologies at this stage are advanced enough that their application can be demonstrated, business risks are significant because of high costs of production and low market demand. A recent analysis[2] found that commercial venture capital was reluctant to go into clean energy technology development due to the lower returns and longer timeframes involved and the fact that investors saw more interesting

[2] New Energy Finance on behalf of UNEP SEFI Public Finance Alliance, *Public Venture Capital Study*, 2008.

opportunities in later-stage private equity transactions, once the technology is proven and ready for roll-out.

4.1.6 Role and channels for government intervention

Brief overview

Risk is a critical obstacle to the flow of future revenue streams for financing development, demonstration and deployment of new technologies. Uncertainties inherent in new technologies drive up the cost of capital. This, in turn, decreases the net present value of projects to the point where many become uneconomic.

Governments should step in when macroeconomic factors justify intervention, and clean technology development presents a number of such factors. Developing and deploying these technologies at commercial scale has the potential to counter climate change, addressing the greenhouse gas externality. Two important attendant benefits associated with developing and deploying low-carbon technologies are job creation and spurring innovation around the economy.

In developed countries, Governments have a role to play in reducing the cost of capital and improving access to capital by mitigating the key risks outlined above. This is especially important in light of recent credit market conditions, where even established industrial conglomerates have had difficulties securing long-term credit. The most important role of Government should be to create the **enabling regulatory framework** through policies and incentive schemes, briefly described below. Developed country Governments may also provide support for new technology development and deployment through strategically targeted PFMs aimed at leveraging private sector financing. This could be achieved, for example, by using governments' own credit rating to spur low-cost capital flows to private sector players. Versions of such schemes currently exist in the United States, where a proposed National Infrastructure Reinvestment Bank would provide loans and loan guarantees to back key infrastructure projects. If established, the bank is expected to unlock up to $500 billion in private investment through the incentive schemes it offers. The American Clean Energy and Security Act of 2009 contains a proposal for a similar entity – a federal clean energy bank. The bank would provide direct loans, letters of credit, loan guarantees, insurance products and other credit enhancement products to promote widespread development, demonstration and deployment of clean energy, energy infrastructure, energy efficiency, and manufacturing technologies.

In the developing world, stronger intervention will be necessary to unlock private-sector investment in new technologies[3]. As in the developed world, a stable national **regulatory**

[3] See UNEP Finance Initiative, *Financing a Global Deal on Climate Change*, 2009.

regime can de-risk investments in new technologies. But given the budgetary constraints facing most developing country Governments, additional funding may be necessary to underwrite the costs of low-carbon policy frameworks. **Transfers of purely public finances**, such as direct public financing of projects, will be needed, as for many countries sound **regulatory frameworks on their own may be insufficient** to mobilise the many types of investment needed to move a technology from early innovation to scaled-up deployment and market transformation. Still within the realm of purely public financing, **building absorptive capacity will also be a key issue** in the developing world, both in terms of developing the project pipelines and the enabling conditions needed to make them commercially viable. Project developers often require support in preparing projects for investment, particularly in uncertain and evolving regulatory environments where timing costs and development risks are significant. In terms of institution building – building the capacity of government ministries, universities, research institutes, businesses, and civil society – this in itself has a cost which must be anticipated to ensure long-term impact. Finally, as in the developed countries, but potentially on a significantly larger scale and through a greater variety of instruments, **PFMs will need to be made available** to ensure private finance is leveraged early on to ensure carbon lock-in is avoided and the developing countries are able to step onto a low-carbon development path.

The following sub-sections will, first of all, briefly look at the **public policy mechanisms** that can play a significant role in creating and supporting markets for low-carbon energy generation technologies. Then, the **PFMs** that to date have been most successful at leveraging private sector financing for low-carbon technologies and energy generation will be considered.

Regulatory frameworks and policies

Various policies are needed to enable the development and deployment of technology along the technology innovation pathway. The correct policy mix must evolve over time, as technologies and markets mature, volumes increase and cost reductions are realised. Thus, during the development stage, policies are needed that support innovation and accelerate technology R&D processes. During the demonstration and initial deployment stages, policies are needed that foster an initial demand for the technology and bring down barriers to its market entry. Once the technology is ready for wider deployment, including transfer to other countries, policies are needed that put a price on carbon via national or international emissions cap and trade schemes or other forms of carbon markets. Indeed, **carbon markets** represent one of the key mechanisms that can directly incentivise certain technologies (such as CCS) and indirectly support the deployment of other technologies (such as renewables) by providing an additional revenue stream for entities investing in the projects. In addition to carbon markets, **removing subsidies** for fossil fuel energy production and consumption will also be essential, as it currently represents a de facto

reward for carbon emissions and therefore a disincentive from investing in non-subsidised alternatives[4].

In addition to the overarching aim of putting in place deep and liquid international carbon markets and **removing subsidies** for fossil fuels and energy derived from fossil fuels, government policies whose specific goal is to promote renewable energy fall into two main categories: (1) policies that fix a price to be paid or a quantity to be produced and (2) investment cost reduction policies[5].

Price-setting policies reduce cost barriers by establishing favourable pricing regimes for renewable energy relative to other sources of power generation. **Quantity-forcing policies** mandate a certain percentage or absolute quantity of generation to be supplied from renewable energy at unspecified prices. The two most widely used market deployment policies in the electricity sector are the feed-in tariff and the quota obligation known as the renewable portfolio standard (**RPS**).

Feed-in tariffs set a fixed price for utility purchases of renewable energy. RPS require that a minimum percentage of generation sold or capacity installed be provided by renewable energy. RPS programmes are often combined with tradable green certificates issued to producers of certified green electricity to prove compliance with a quota obligation.

Investment cost reduction policies, often combined with an element of pure public transfer, provide incentives for voluntary investments in renewable energy by reducing the costs of such investments. These include, for example:

- capital subsidies, grants, or rebates which reduce the initial capital outlay by consumers for renewable energy systems;
- fiscal incentives such as production and investment tax credits, carbon tax or VAT exemptions, and the elimination of import duties;
- energy production payments or tax credits based on kilowatt hours of energy produced by renewable and fed into the electric grid; and
- investment tax credits, which offer investors credit against their income tax.

[4] OECD, *The Economics of Climate Change Mitigation: Policies and Options for Global Action beyond 2012*, 2009.
[5] See REN21, *Renewables 2007 Global Status Report*, 2008; and F.Beck, E. Martinot, *Renewable Energy Policies and Barriers*, in Encyclopaedia of Energy, 2004.

Figure 2 - Successful government programs have mitigated specific risks

	Successful financing instruments	Impact on risk
Offshore wind	▸ Backed by generous feed-in tariffs with long-term price certainty, Denmark was the first country to build an offshore wind park (1991). Since that time, it has scaled up to 410 MW offshore today, with about 450 MW of additional capacity under construction	▸ By tendering for offshore wind parks with a fixed feed-in tariff, the Danish Energy Agency has eliminated financial risk related to electricity prices or counterparty credit, as well as strategic risk. The agency is in the process of addressing political risk by conducting geophysical/geotechnical surveys of the seabed and holding the subsequent public hearings before tendering
Onshore wind	▸ In 1990, the German Renewable Energy Law required grid operators to provide free access to the grid for all renewable generators and set a feed-in tariff for wind power. By 2008, Germany had nearly 24 GW of installed onshore wind capacity	▸ By requiring free connection to the grid and setting a stable price for power fed onto the grid, the government has eliminated financial risk related to electricity prices or counterparty credit. Strategic risk has been mitigated via a gradually decreasing feed-in tariff for each new vintage of wind parks
Solar	▸ Generous feed-in tariffs with long-term price certainty have prompted significant solar build-out in Spain, where 2.5 GW of new capacity was installed in 2008 alone	▸ By providing a fixed, long-term feed-in tariff for solar power, Spain has eliminated financial risk related to electricity prices or counterparty credit, as well as strategic risk
Hybrid vehicles	▸ In Japan, hybrids are tax-exempt. Coupled with relatively high fuel prices, this has prompted substantial uptake. In May, 2009, hybrids represented 12% of all light-duty vehicles sold in the country	▸ By increasing the fuel price risk associated with conventional cars and eliminating taxes on hybrids, Japan has reduced the relative financial and political risks of hybrids
Biomass	▸ Benefiting from the stringent ethanol mandates in Brazil, the biomass power production industry is expanding, with global players like Areva committing to plant construction over the next few years	▸ By heavily backing related ethanol, Brazil has reduced the political and financial risk of biomass, which, in Brazil, is a major by-product of sugar-based ethanol production
Carbon Capture and Storage	▸ Although it is early, the UK's support mechanisms for CCS, coordinated through the new Office of Carbon Capture and Storage, present much promise. Funding will be provided for up to 4 demonstration plants	▸ While the precise nature of funding is being consulted on, it is likely that it will be structured in such a way to mitigate key risks, including operational risk from system complexity, strategic risk from early technology adoption, and financial risk from leakage and feedstock costs
Geothermal	▸ Since the 1980s, the Philippine government has promoted the development of geothermal power through a subsidiary of the national oil company. By 2007, the Philippines had nearly 2 GW of geothermal capacity, the second largest in the world	▸ Through vigorous support of a Filipino parastatal, the political and financial risks of investing in geothermal have been mitigated
Small hydro	▸ With support from the United Nations Development Program, the Global Environment Facility, the World Bank and the Asian Development Bank, India has installed 114 MW of small hydro. An additional 220 MW are under construction, with 94.5 MW more approved for development	▸ Support from this group of multi-laterals has mitigated political and financial risk

Source: Deutsche Bank Group Analysis.

As shown by example in Figure 2, there is **now quite significant experience with policies used to develop the clean energy sectors**, mostly undertaken within countries and more recently multilaterally through mechanisms established under the UNFCCC. The track record of these and other successful programs can provide guidance to policymakers as they seek to craft a strategy to deploy these technologies at scale.

To be effective, policies must:

- be long-term, transparent and consistent with secure and predictable payment mechanisms;
- be appropriate, targeting support according to the technology type and level of maturity;

- introduce incentives that decrease over time as technologies move towards market competitiveness;
- eliminate non-economic barriers (grid access, administrative obstacles, lack of information, social acceptance);
- provide fair and open access to distribution channels (e.g. transmission grid);
- have strong public acceptance and support;
- be enforceable.

Public financing mechanisms

In addition to public policy mechanisms, provision of public finance will be essential if significant financial flows from the private sector are to be ensured.

Clean energy generation projects generally operate with the same financing structures applied to conventional fossil-fuelled energy projects. The main form of capital involved include equity investment from the owners of the project, loans from banks, insurance to cover some of the risks, and possibly other forms of financing, depending on the specific project needs. Low-carbon transport options such as hybrid or electric vehicles might have a different array of financing characteristics, but the fundamental capital needs generally remain the same.

For many projects the availability of these needed forms of commercial financing is limited, particularly in developing countries, where the elevated risks and weaker institutional capacities inhibit private sector engagement. The gaps can often only be filled with financial products created through the help of PFMs.

To make the best use of public funding, it is essential that two objectives are sought when designing and implementing clean energy or other climate-focused PFMs. First, funds should directly mobilise or leverage commercial investment into technology innovation and deployment, and secondly, they should indirectly create scaled-up, commercially sustainable markets for those technologies. Direct short-term benefits should not create market distortions that indirectly hinder the growth of sustainable long-term markets or attempt to crowd out or substitute for purely private investments that may be occurring in any case. Research shows that if PFMs are appropriately selected, structured and targeted, their **leverage ratio** can range, on average, between 3 and 15:1[6].

Public financing mechanisms are funded either by grants or loans from governments, or can be raised as low-cost funds through the capital markets if backed by a government

[6] UNEP SEFI, *Public Finance Mechanisms to mobilise investment in climate change mitigation*, 2009.

guarantee. These funds are typically channelled through and managed by **development finance institutions** (**DFI**s): the relevant DFI provides concessional or grant funding to a commercial financial institution (**CFI**) in the recipient country; the CFI then provides structured adapted financing to climate projects. **PFMs are most frequently operated by DFIs, but other institutional models are also being used**, including national investment authorities, energy management agencies and public-private investment companies. In addition, a wider range of development actors are now focusing efforts on mobilising climate investment, mostly through different forms of finance sector engagement and institution-strengthening activities.

One of the reasons public financing is needed is to help the commercial investment community gain experience with the new types of revenue streams that clean energy and other low-carbon projects provide, including carbon, but also electricity or 'green' revenues that may be delivered through new regulatory instruments. Without an understanding of these revenue streams, few investors will be willing to provide the up-front finance for these capital intensive projects. Having a public entity co-invest up-front capital in a project can provide the sort of comfort factor that private investors need to enter this space.

The following provides an overview of the main public financing mechanisms being used today in the clean energy sector and highlights new or emerging approaches that could improve the catalytic effect of this public funding.

► Mobilising Debt

The bulk of the financing needed for clean energy generation projects is in the form of loans (concessional or otherwise), termed **debt financing**. The challenges to mobilising this debt relate to access and risk. Many countries lack sufficiently developed financial sectors to provide the sort of long-term debt that clean energy and other infrastructure projects require. In these situations PFMs can be used by DFIs to provide such financing, either directly to projects or as credit lines that deliver financing through locally- based commercial financial institutions. Credit lines are generally preferable, when possible, since they help build local capacity for clean energy financing.

Credit lines can be an effective means of providing the needed liquidity for medium to long-term financing of clean energy projects. In markets where high interest rates are seen as a barrier, credit lines can be offered at concessional rates or structured on limited/non-recourse basis, or alternatively offered as subordinated debt to induce borrowing and direct credit to target sectors and projects: by taking on a higher risk position in the financial structure, this approach can leverage higher levels of commercial financing.

PFMs can also be targeted specifically at **reducing the financing cost of credit provision**, while the commercial finance institution provides the actual bulk of investment. The spread between the interest rates collected from borrowers and the competitive returns paid back to the CFIs is essentially financed by public funds buying down the interest rate. These

public-sponsored credit enhancement approaches have been used in developed countries when governments have wanted to increase lending to high-priority sectors, including clean energy. The KfW, for instance, follows this approach in Germany to facilitate increased bank lending for energy efficiency. Credit-enhancement approaches in the development community, however, are still new and rarely used. (Whether credit lines are structured as senior or subordinated debt facilities, CFIs usually need technical assistance to make use of them. Such assistance aims at helping CFIs up the learning curve, reducing transaction costs, as well as fostering the demand for such financing.)

Though credit lines are often used for clean energy project financing, their leverage potential is relatively low. Therefore, they are not suited in developing economies that do not lack basic liquidity for infrastructure financing, but rather lack incentives and revenue certainty needed to offset the elevated risks and initial transaction costs associated with clean energy generation projects. Here **guarantees** could offer a more effective instrument for CFIs who despite adequate medium to long-term liquidity are still unwilling to provide financing to clean energy or other climate projects because of high perceived credit risk (i.e. repayment risk). The role of a guarantee provided by the DFI is therefore to mobilise domestic lending for such projects **by sharing with CFIs the credit risk of project loans they make with their own resources**. Guarantees are most effective at addressing elevated perceptions of risk in that they help a bank gain experience in managing a portfolio of clean energy loans, which puts them in a better position to evaluate true project risks. Guarantees are appropriate in financial markets where borrowing costs are reasonably low and where a good number of CFIs are interested in the targeted market segment.

Guarantees are typically partial, which means that they cover a portion of the outstanding loan principal (generally 50-80 percent). This ensures that the CFIs maintain the risk for a certain portion of their portfolio, which fosters prudent lending and is consistent with the principle that public intervention should be limited to covering the risk associated with policy delivery. The responsibility for taking remedial action in events of default remains with the CFIs.

The following table describes some of the different guarantee structures used with clean energy financing, both on the generation side and with energy efficiency.

Guarantee Structure	Description	Market Segment
Pari passu	Recovered monies are proportionately shared by the CFI and the guarantor	Large scale grid-connected RE
Subordinated recovery	CFI has the first right on all recovered monies before any amount is repaid back to the guarantor	Large scale grid-connected RE
Portfolio guarantees /Loss reserves	Guarantee reserves that cover first losses that a CFI sees on	Small scale RE and EE; energy access market

Guarantee Structure	Description	Market Segment
	a portfolio of small loans, for example financing for solar home systems.	
Liquidity support	Guarantee reserves that can be drawn down by CFI to keep their customer loans current, avoiding final default and loss	Large scale grid connected RE; medium scale RE and EE

► Mobilising Equity

Equity financing is the innovation capital invested in technology and project developments with the greatest exposure to risk, but which also earns the highest return on investment when all goes well. **Equity investment funds** can be structured to provide a range of equity-type financial products, from venture capital for new technology development, to early-stage equity for project development activities, to late-stage equity for projects that are already fully permitted and ready for construction. Typically, these funds invest equity in private entities (i.e. those companies not listed on public stock exchanges) or transactions. This is known as private equity[7]. In the area of clean energy generation such equity funds are set up to make investments in projects and companies such as equipment manufacturers, project developers and energy service companies (ESCOs), project-specific special purpose companies, independent power producers, and energy utilities.

Due to the many risk and capacity-related challenges mentioned above there are **significant gaps in the availability of equity financing for clean energy generation in the developing world**. Banks do not generally provide equity financing and the type of investment community that does so in the developed world is hardly present in developing countries. Equity-focused public financing mechanisms are therefore needed that are structured either as *funds* that take direct investments in companies and projects, or as "*funds of funds*" (which can also be referred to as cornerstone funds) that invest in a number of commercial managed funds, each of which then invests in projects or companies. The cornerstone funds approach can be more catalytic, leveraging private capital both into the fund itself and later into the investments that the fund makes.

The DFI community has been building experience with private equity investing in the clean energy sector, which can serve as the basis for identifying what works and then scaling it up. One of the key issues with equity-focused PFMs is determining how best to mobilise the private sector without competing with it; in other words, how to crowd in rather than

[7] Public equity funds also exist to invest in publicly traded companies, although outside of some new listings in China, India and Brazil, there are few such clean energy companies today in the developing world.

crowd out private investment. This requires better measures of additionality than are applied today, ensuring that **public monies are only used in instances where the private sector is unable or unwilling to engage**. Without improved methods of measuring the causality between public financing and leverage, misaligned incentive structures can result in public funding going into activities that would have happened without it, and activities that rely on it remaining un-funded. **The concept of *leveraging* private sector investment needs to be framed within the context of proven additionality** for it to be useful as a high level indicator of public finance effectiveness.

In addition, **it is important to ensure that equity finance is not targeted exclusively at *ready to build* projects**, as is currently the case in the developing world. Today, few equity investors are willing to risk capital in earlier-stage project or business development activities. This early-stage investment phase, sometimes called seed financing, is ripe for innovation in the use of public funding to mobilise investment into business start-ups and early-stage project developments. Such innovation capital barely exists in developing countries, leaving entrepreneurs undercapitalised and clean energy markets very slow to develop. New approaches are needed.

The E+Co experience

The organisation E+Co has seed-financed over 200 clean energy companies in the developing world in the past 10 years, in part through an investment fund mandate from the International Finance Corporation. E+Co blends public, private and philanthropic sources of financing in a way that allows them to invest patient capital on terms that are appropriate[8] for local entrepreneurs. More recently a Seed Capital Assistance Facility operated jointly by the United Nations Environment Programme, the Asian Development Bank and the African Development Bank, has been using PFM funding to incentivize commercial fund managers into making seed finance investments.

It has been found that at any scale PFMs can be made most effective and efficient if they:

- Accurately assess technology market barriers and financial market conditions;
- Target market segments where the project economics are compelling;
- Take a programmatic approach to financial mechanism design;
- Use and strengthen existing capacities throughout the chain of financial intermediation;

[8] One of the challenges with the private equity model is that it either requires very high returns for engaging in risky projects, or can manage with moderate returns if the risks are low, for example with fully developed infrastructure projects. Clean energy projects, once fully developed, can fall into this second category, but earlier developments are considered too risky and not sufficiently attractive to merit much interest from private equity investors.

- Address the lending or investment criteria of commercial financial actors;
- Define project responsibilities based on a complete roles and risk analysis;
- Include marketing and market aggregation plans; and
- Develop plans for public or donor-supported technical assistance programmes to build capacities, fill gaps, and take on any roles or risks not assumed by commercial parties.

4.1.7 Recommendations

► **Improve the revenue stream**

Regulatory approaches will be needed in many sectors to help the private sector translate low-carbon value streams into the sort of revenue certainty needed for financing long-term infrastructure developments. It is recommended that a new climate architecture should allow, for instance, **developing country Governments to finance a feed-in tariff policy through scaled-up global carbon offset markets**. The use of a programmatic feed-in tariff policy has been very successful in a number of developed country contexts discussed in this section, including Germany and Denmark. Stable, long-term feed-in tariffs can similarly reduce strategic and financial risk for clean energy generation in the developing world - but their wide-scale implementation will require helping governments raise the needed funding through cross-border financial flows based on the carbon markets.

► **Mobilise debt**

Up-scaling the climate-focused debt markets will initially require the engagement of both public and private actors to share risks, address financing gaps and bring down the barriers to entry. **Two facilities are proposed** for this purpose, each targeting countries at different stages of development and therefore offering a different mix of instruments. The **first facility** would aim to mobilise debt financing for clean energy projects in **middle-income countries**, where the financial markets are sufficiently developed but not yet engaged in the low carbon sectors. A central objective of the facility would be to redirect financing that is already present in these countries away from fossil fuel exploitation to clean energy projects. The facility would not directly lend to projects, but would offer a suite of instruments, including financial risk management products, political risk insurance and other credit enhancements.

The **second facility** would aim to mobilise debt financing for clean energy projects in **low-income countries** where the financial markets are insufficiently developed to finance infrastructure investment of any form. Mechanisms to compensate for shallow capital markets would be offered, ranging from direct financing, public-private co-financing

through syndications, risk mitigation products for deepening domestic lending, as well as technical assistance to cover the skills gap.

Both facilities would be encouraged to finance programmatic work coming out of Low Carbon Growth Plans.

► **Scale-up private equity investment**

Address the equity financing gap through a fund of funds (or cornerstone funds) approach that sees public monies invested in a series of large scale commercially managed infrastructure funds. This public-private financial structure would require that public monies leverage private capital engagement from the institutional investors' community.

4.2 Energy Efficiency

Authors: *Josue Tanaka, EBRD; Alex Veys, Green Chicane*

4.3.1 The challenge

Energy efficiency must play a key role in the climate mitigation effort for two key reasons:

- Improving energy efficiency can be the **least-cost strategy to reduce emissions** and can have an immediate impact; unlike many other technologies necessary to move to a low-carbon future.

- Energy efficiency policies have **already proved to deliver significant energy savings**. A recent IEA publication[9] found that improvements in energy efficiency in 14 major economies from 1990 to 2004 had reduced energy demand by 14% compared to "business as usual".

While noting the difficulties with estimating energy efficiency potentials, the IEA believes that cost-effective savings are significant. If implemented globally, and without delay, the IEA estimates that the proposed actions could save around 8.2 Gt/year (92EJ/ year) by 2030 (see Figure 3 below).

Despite the obvious rationale for energy efficiency, there are considerable obstacles to its implementation at the scale required for the following reasons.

Firstly, it must be noted that energy efficiency is of relevance to all sectors of the economy. From a product perspective, efficiency covers everything from double glazing through district heat systems to transport. From the perspective of organisations, it covers everything from a single dwelling or company to a multinational company or country. This **broad coverage** creates a complex problem for incentivising energy efficiency, whereby the sets of measures needed to introduce energy efficiency at country/multinational organisation level will differ radically from those aimed at SMEs.

Secondly, energy efficiency measures require **upfront investments which can be high** and **do not create a revenue stream**, which creates specific financing challenges.

Other barriers to energy efficiency investments to date have included **lack of senior management understanding** of the cost savings that are possible with the latest technology; requirements for **short payback times**; **unavailability of capital**; and

[9] IEA, *Energy Use in the New Millennium*, 2007.

misaligned incentives between departments within companies, or property owners and tenants.

The following section aims to address the necessary policy and regulatory as well as financing measures for energy efficiency, with a view to examining how the above challenges can best be address through strategic public support.

4.3.2 The investment profile

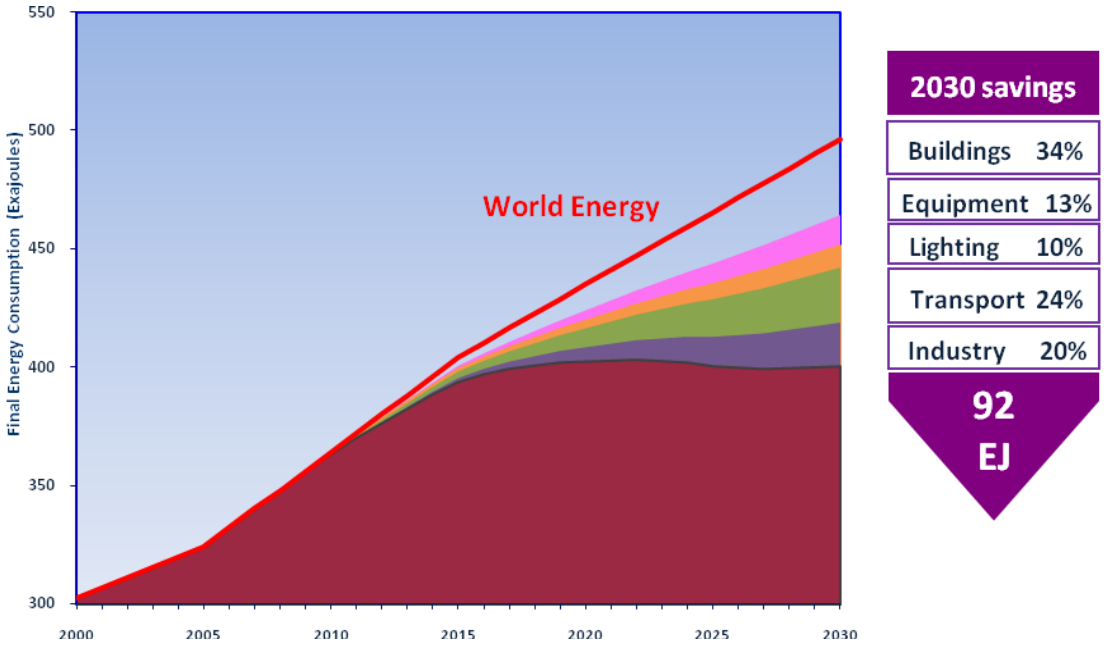
Energy efficiency measures can be implemented in a **broad range of sectors** as shown in **Figure 3**. These benefits can come **directly** (through process improvements in industry and commercial undertakings) or **indirectly** through improvements to transport patterns (heavy goods vehicles account for 30% of global fuel use), in lighting use (commercial and industrial sectors account for 61% of total use) and in building fabrics. In addition to being applicable to all sectors of the economy, the potential for **energy efficiency savings is also geographically universal** (ie applicable to the developed, as well as the developing countries), although the savings potential is higher in less developed economies (with older and less efficient plant) and in resource-inefficient countries. Finally, energy efficiency savings can be achieved by **all units of the economy**, from the biggest multinational enterprises to small SMEs.

In light of the above broad applicability of energy efficiency, it is imperative that the **right incentives and regulations are put in place to ensure that the right technologies and entities are targeted** and therefore the right energy efficiency investments are inentivised.

Energy efficiency financing is distinguished by the following features:

- Efficiency investments **create savings on operating costs** by reducing future energy use. This is clearly not a revenue item but does have a direct impact on the profitability of a company: more so with rising energy or carbon prices.
- The potential future savings have to be weighed against the potentially **upfront capital expenditure (which can be high)** and potential loss of income during the operational down-time required for installation of the relevant equipment.
- The savings generated from energy efficiency investments may fall if business volumes reduce. Hence, in a recession, the benefits may be lower but the impact more important as they will help preserve profitability.
- Increased **energy efficiency offers a new source of economic growth** by increasing the demand for products such as advanced insulation, and the accelerated retirement and/or replacement of inefficient energy-using goods such as appliances and vehicles and therefore represents **promising new markets** for innovative investors.

Figure 3 - IEA Energy Efficiency Policy Recommendations, 2006-2008. Impact on World Final Energy Consumption



Source: IEA

4.3.3 The role of the private sector

The private sector has a stake in every aspect of energy efficiency, including in:

- **Implementing** energy efficiency measures to benefit from savings such investment can offer;
- **Financing** energy efficiency investments;
- Developing and supplying **energy efficiency products and services** such as highly efficient appliances, insulation materials and insulation instalment services.

Consequently, all types of entities, from SMEs to multinational companies and financiers have a potentially important role to play in stimulating energy efficiency investments.

4.3.4 Risk profile

The risk of investing in energy efficiency measures is **primarily dependent on the market and/or political and regulatory structure** in which the project is implemented. It is therefore critically important that a political and regulatory framework is constructed to stimulate energy efficiency investment, as discussed in the paragraphs below.

The **risk profile relating to the technical energy efficiency component is generally low**, although in some cases real risk can exist where these technologies are new in a particular country or region, with correspondingly low operator experience and service backup. In addition there may be **real commercial risk** which can be tackled through the appropriate use of public-private financing mechanisms, also discussed below. **Implementation risk** (relating to managerial experience and cultural barriers) also exists, which can be addressed by technical assistance focussing on addressing energy management capability.

4.3.5 Role and channels for government intervention

Before the specific regulatory frameworks, policies and finance mechanisms aimed at increasing private investment in energy efficiency are discussed, it is important to ensure that **public support and intervention is only provided where it is required**. As the EEPIC example below indicated, often private finance can be mobilised without public participation and it is essential to ensure that in such circumstances the public sector does not step in to substitute for self-driven private sector action.

The Energy Efficiency Project Investment Company

The Energy Efficiency Project Investment Company (EEPIC), structured by APG Asset Management (a pension asset manager in the Netherlands) in 2008, provides an example of unilateral private action in mobilising significant financing for energy efficiency. The EEPIC fund, managed by the US-based Energy Performance Services, targets end users of energy in China and will invest in energy efficiency projects through special purpose entities. The fund will bring together technology providers and experienced energy efficiency specialists in a structure that allows international investors and local banks to provide financing to energy users to upgrade their plant and facilities. The cost savings generated by the reductions in energy use will be shared between the energy user and the fund. The fund expects to generate very attractive investment returns. APG has invested USD 50 million in the EEPIC fund, the total initial target size of which is USD 100 million. Given the scale of energy efficiency opportunities in China, and the current underdevelopment of the energy efficiency industry there, the fund manager is confident that significant scaling up will be possible in a short space of time.

Here innovation in business models and financial structuring has led to the development of a fund that will make far larger volumes of capital available for energy efficiency than has hitherto been the case, while at the same time creating highly attractive investment opportunities for institutional investors such as pension funds.

Regulatory frameworks and policies

In addition to the general regulatory frameworks and policies discussed elsewhere in the overall section (and including removal of subsidies for fossil fuel use and creating and maintaining a price for carbon), there are a number of specific policy measures that could be put in place to incentivise energy efficiency in specific areas, including (without limitation) in transport efficiency, building efficiency and appliance efficiency, as briefly discussed below.

► **Transport efficiency**

Developing countries, as they become wealthier, will see an increase in passenger miles necessitating legislation to increase the efficiency of vehicles. The policy measures aimed at introducing greater transport efficiency may include:

- The use of alternative energy carriers (eg electricity) for vehicles;
- The imposition of higher taxes for use of roads;
- Fuel efficiency standards.

Particularly as regards the fuel efficiency standards, **in the absence of such measures the private sector will not be incentivised to incur additional production costs (and therefore product costs) associated with integrating the energy efficiency measures.**

► **Building efficiency**

A range of measures are available to promote energy efficiency in existing and new building stock, including:

- Building standards for newbuild;
- Energy efficiency ratings for all buildings sold;
- Insulation of existing buildings.

Most standards and policies are targeted at the running cost of buildings. Indeed this is an appropriate target as about 90% of a building's life time carbon footprint comes from its

use and 10% from its build[10]. However, as buildings become closer to the ideal of having a zero carbon footprint, the relative carbon cost of construction will increase. This should be addressed by **ensuring, through regulatory standards, that low carbon building materials are used and that buildings are constructed with longevity in mind.**

► **Appliance efficiency**

In most developed countries, domestic appliances are currently rated and labelled for efficiency. Indeed, the **energy efficiency labelling policy** has been extremely successful at triggering a shift in the consumption patterns among the general public. In addition, the EU has pioneered **eco-design of products through a quality standard labelling scheme**. It is likely that with time similar or comparative standards will be applied in the developing countries; however, leadership by example from the developed countries will be needed to incentivise the right regulatory and policy changes in the developing counterparts.

Public financing mechanisms

Policies and regulatory frameworks alone will not be able to deliver energy efficiency investments at the required scale – financing will be another key priority. In the context of the economic crisis particularly, access to finance is often the reason given for not implementing efficiency measures. Nevertheless, while large organisations in the developed countries may still be able to access debt capital through the public markets for efficiency measures, small institutions and companies in developing countries (as well as the countries themselves) will and do have difficulty accessing these markets. The following paragraphs will consider how this can be redressed via targeted public interventions.

► **Institutional framework for finance delivery**

As stated above, energy efficiency is universally applicable to all countries, industry sectors (including the residential sector) and all sizes of companies. Finding the appropriate financial vehicles to channel funds to such a diverse set of agents (small companies to multinationals) will therefore be a challenge. An institutional structure based around energy efficiency would be the most effective vehicle in this regard. Such a structure could facilitate the pooling of resources and expertise, while allowing for participation by recipient countries and civil society in shaping the objectives.

Multilateral development banks (also referred to as MDBs) have a wide mandate and have generally shown leadership in leveraging private financing for energy efficiency.

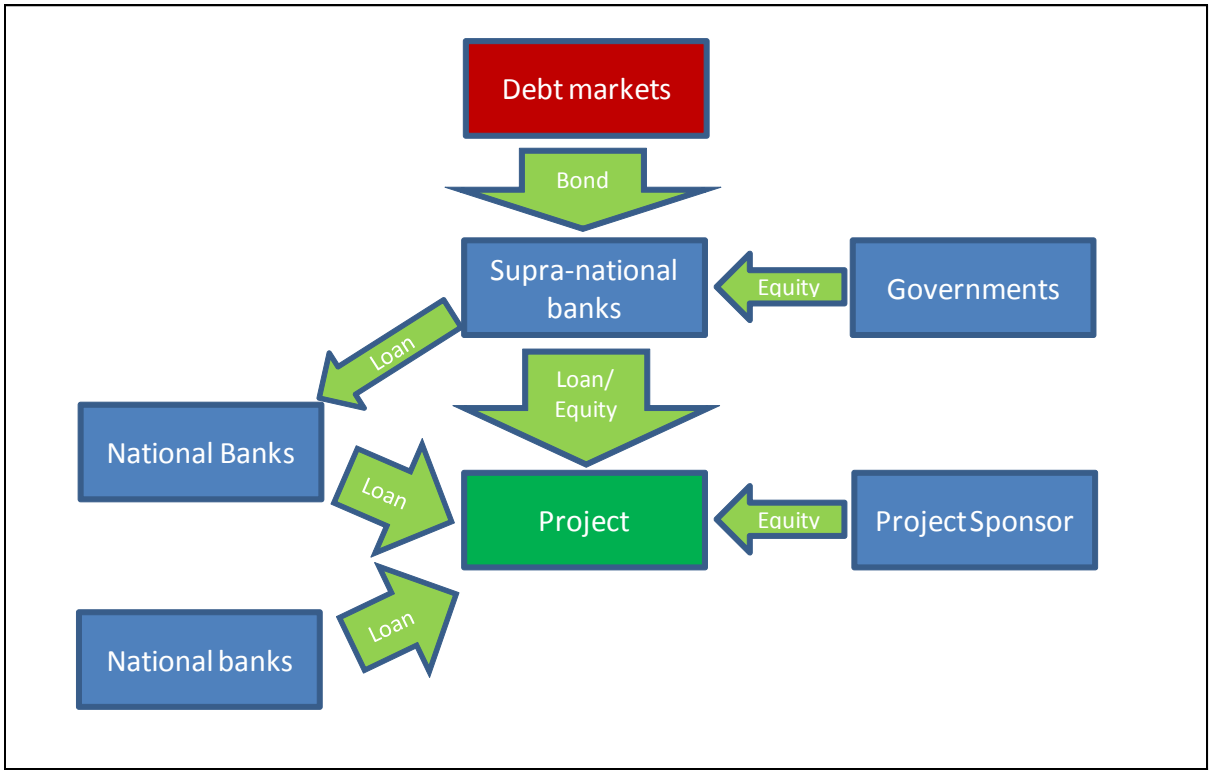
[10] A financial accounting based model of carbon accounting using an example in the built environment: A.Veys, 2008.

Consequently, **while some experts have suggested that there is scope for considering a new supranational agency / MDB or fund to promote and finance energy efficiency projects, there is certainly scope for an enhanced energy efficiency mandate for the MDBs, there may be scope to consider.** It is important that the institutional mandate of any such existing or new agency should go beyond the necessary objective of simply achieving the scale of funding needed, but should also support the developing countries in transforming their regulatory frameworks along with transferring knowledge and expertise.

Figure 4 below exemplifies how MDBs or new multilateral institutions may be able to stimulate financial flows into energy efficiency by leveraging private sector financing. Briefly, financing is raised either through donor funds or via the capital markets. This is then on-lent either via:

- **Direct finance** to larger projects (loans or equity participation), possibly mixed with concessional elements; or
- **Intermediated finance** to smaller projects (shared-risk loans to local banks), again possibly mixed with concessional elements; the latter ensuring access to the smallest market players).

Figure 4 - Flow of public and private funds to energy efficiency projects



The provision of public finance (via, for example, an MDB) to the private sector ought to be undertaken on **market-based terms**, with concessional elements targeted at particular needs where and if required but not applied across the board. Experience from energy efficiency investments shows that public financing on commercial terms can trigger significant private sector investments in energy efficiency projects through direct loans, banking intermediaries or equity participation. Another benefit of financing on commercial terms is that it makes it possible to attract private financial institutions into loan provision through **syndication**. In particular, in large individual transactions, the ability to attract co-financiers is vital to complete the financing due to exposure and deal limits.

► Financing instruments

Different financing instruments should be offered through the institutional framework described so that they are appropriate to a broad range of sectors, and should be sufficiently flexible to operate in changing circumstances between countries and sectors. In all cases below, the **availability of public financing is a catalyst to enable the project to take place**. Potential financing instruments could include:

Type of financing	Description	Leverage created by
Direct loan	Made directly to the project[11]	Project sponsor[12] adds additional cash to the project
Syndicated loan	Loan supplemented by other loans from traditional banks	Bringing in commercial banks to co-finance the transaction and/ or by project sponsor cash
Credit lines	Lending is directly to local banks who on-lend to project	Additional lending from local bank and/or other banks and/or sponsor cash
Guarantee facilities	Loans are guaranteed by the supra-national agency or MDB	Loans from local banks and/or sponsor cash
Equity investment	Money is invested in project as equity rather than as a loan	The equity stake allows the MDB to direct the investment programme of the company into an energy efficient direction

In order to achieve a broad coverage of efficiency projects, especially in sectors that are unlikely to benefit from carbon markets (such as in the residential sector, or the small and medium size firms (**SME**s) sector) and that are impossible to reach in single transactions (due to their small size), a particular focus should be on **credit line**s. These have the advantage of being very flexible and allowing targeted support of appropriate sectors that need financing, as exemplified below.

[11] In this sense a project is defined as a stand-alone project in a distinct legal structure.
[12] The project sponsor is the main equity holder of the project.

Credit Lines for Energy Efficiency: the MDB experience

As outlined above, the key characteristic of energy efficiency is its universal applicability; hence it is crucial that financing is made available to SMEs to ensure energy efficiency measures can be taken at all levels of economic activity. This implies that, to capture the benefits associated with it, many SMEs will need to be at the heart of such change. MDBs, though, due to transaction cost cannot usually address SME clients directly. If finance streams were restricted to direct lending, this sector could not benefit from them. This would mean that a major source of potential energy efficiency would remain unrealised.

Light industry consumes about 30% of industrial energy use and has a disproportionately high level of energy savings potential. This arises because there is less focus on energy management in SMEs where energy is usually a small part of total overheads and low staffing levels result in less specialisation on particular cost-management practices. Several benchmarking studies have found that there is a wide spread in the energy intensity of SMEs for the production of the same type of products. It has also been found that the adoption of simple energy management practices can lead to significant economies. Credit lines utilising local bank expertise can realise this potential.

Credit lines focus on utilising existing local market knowledge and the relationships of local banks in a single or limited number of transactions between an MDB and a local bank. The transactions are usually supported by technical assistance both to the banks and by an energy audit service (free of charge or charged at cost) which is made available to the project sponsors. Depending on market circumstances, and to encourage investment in energy efficiency, loans to project sponsors can be enhanced by grants. Funds are advanced to banks on a shared risk basis, with no security required and the loan status being subordinated. Where concessionality is required, MDBs can provide the concessional element through additional donor funds. In a new energy efficiency finance framework, it would therefore be important to make available two streams of public money:

a) Larger volume of funds made available at **commercial rates** to support investment (this could be used in a revolving fund), accompanied by:
b) Smaller volume of **concessional funds** (grants) to trigger investment, pay for management of the facility, and support skills transfer.

The ratio of "a" to "b" can be expected to be at least 3:1, but will depend on particular market sectors and could reach up to 20:1, where only technical assistance is required. Project sponsor cash would further increase leverage to a minimum of 6:1 and an observed maximum of 72:1.

In order to increase penetration in recipient countries, finance facilities should also focus on creating **local supply capacity** for low-carbon technologies to achieve long-term transformation (e.g. manufacturing of high-quality insulation, buildings materials, high-efficiency boilers or wind turbines). The financing instruments should aim to address the high real and/or perceived risk involved in such projects, by allowing the project sponsor to share a considerable part of it with the financiers. Leverage ratios should be comparable to other large industrial projects, at about 1:2 to 1:4.

The Table below provides **specific energy efficiency project financing examples,** focusing on their financial attributes and the related private sector financing leverage.

Sector	Type of project financing	Type of financing and route	Leverage provided by	Gearing	Examples of Projects	Payback years	Risk	IRR
Large Scale Industrial	Direct Industrial energy efficiency financing	-Direct loan -Equity investment	-Syndicated loan -Sponsor cash -Equity ownership	1:1 - 1:4	Boilers Compressors Heat recovery On-site generation	1.5 - 5	economy, regulation, energy prices, culture	
SMEs Municipaitie sResidential	Sustainable Energy Finance Facilities	-Loan through local banks	-Sponsor cash	1:1.5	Motors, Boilers, Compressors, Heat recovery On-site generation, Insulation, Heating	2 - 6	On-lending banks credit, End borrowers, sharing risk and return,	10-60%
Privatised municipal utilites	Municipal Infrastructure Energy Efficiency Financing	Direct or through credit line	Syndicated loan, Equity ownership	1:1.5 - 1:2.5	CHP, District heating, Heat networks		Political, regulatory, operational, technology	
Property Sector	Property Energy Efficiency Financing		Syndicated loans, Sponsor cash	1:2 - 1:3		7 - 10	Implementation, experience, economy	20-30%
Energy Producers	Natural Resources Energy Efficiency Financing	Direct loans or equity investment	Syndicated loans, sponsor cash, carbon transactions	1:1	Gas flaring and coal-bed methane	5 - 6		
Power stations	Power Sector Energy Efficiency Financing		Syndicated loans, sponsor cash, carbon transactions	1:1	Refurbishment, reconstruction, and new build	8 - 10	Economy, regulation, energy prices	15-20%

4.3.6 Recommendations

In order to ensure that the private sector can play the role it needs to play for achieving the desired outcomes in climate change mitigation, the **measures outlined below should be considered**, always bearing in mind that successful up-scaling of energy efficiency finance will only happen if public interventions do not crowd out or substitute private action:

- Finance (**both at market rates and concessional**) should be made available to the private sector in market-based frameworks, with a focus on supporting the implementation of best-available technology.

- The framework in which the finance is provided should not be restricted to direct project finance, but must also allow for **technical assistance** and other support to bridge skills and knowledge gaps in all sectors of the economy.

- The framework must be flexible enough to enable access to finance by both large- and small scale enterprises and projects in all sectors of the economy and therefore must be provided **to local financial institutions**, and not just directly to projects.

- **Policy and regulatory measures** are needed to address market failures and barriers to implementation, such as the continuing failure to integrate climate damage costs into energy prices, or landlord/tenant issues.

- Policy and regulatory measures are also needed to ensure that efficiencies are realised in developed countries leading on to similar policy and regulatory measures in developing markets.

- There is a potential requirement for **an enhanced mandate to existing MDBs and/or a new supranational development bank** specifically targeted at delivering finance, expertise and education to all organisations to improve energy efficiency in its broadest context.

4.3 Forestry

Authors: *Stuart Clenaghan, Eco System Services Limited in collaboration with Nick Godfrey, UK Department for International Development (DFID)*

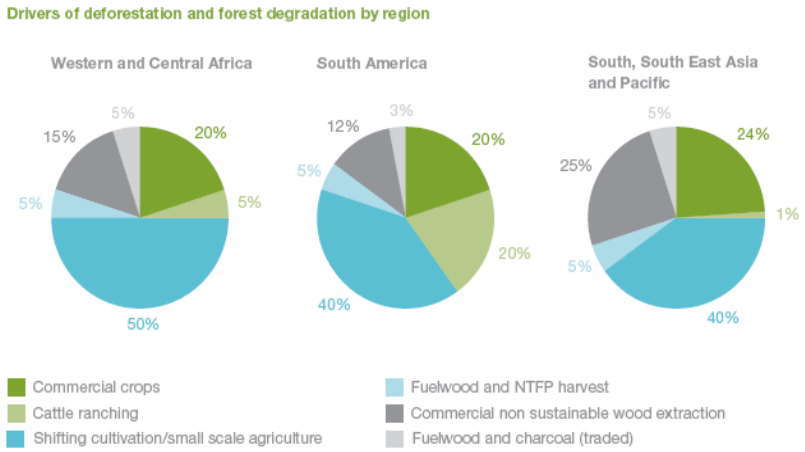
4.3.1 The challenge

Reducing greenhouse gas emissions from deforestation and degradation of forest land (**REDD**) and enhancement of forest carbon stocks (**REDD+**) is a cornerstone of the global strategy to combat climate change. Around 20% of all emissions are generated from the forestry sector. Deforestation also leads to the loss of ecosystem services including biodiversity, soil stabilisation, cooling and rainfall generation, causing environmental damage and extreme weather conditions. Furthermore, scientific evidence demonstrates that tropical forests are net absorbers of CO2, sequestering up to 4 tonnes of CO2 per hectare per year. Deforestation not only releases stored carbon, it also destroys nature's carbon capture and storage system.

Underlying deforestation is **demand for land-based commodities** – whether it is low economic value subsistence crops or higher-value traded commodities such as timber, soya, palm-oil, beef, rubber and coffee. In many countries demand is driven by domestic consumption. By way of example, more than 86% of timber extracted from the Brazilian Amazon is used in-country, and less than 25% of the 25 million m3 of timber extracted annually from west and central Africa is exported[13]. **Demand for commodities will only increase as populations grow and economic prosperity rises**.

[13] United Nations Food and Agriculture Organization (FAO), *Global Forest Resources Assessment*, 2005.

Figure 5 - Deforestation is driven by the needs of growing populations for timber, energy and food



Source: Blaser J. and C. Robledo (2007). Initial Analysis on the Mitigation Potential in the Forestry Sector. Report prepared for the Secretariat of the UNFCCC.

To counter deforestation, investment is required to transform the path of economic development in forest nations from the extractive use of forests to sustainability. This will require long-term commitments to REDD+ including planted forests, sustainable forest management, intensive agriculture, and conservation. REDD+ could contribute to the alleviation of poverty, as well as generating attractive financial returns from sales of sustainably produced products and environmental services, such as carbon. However **at present, private sector investment in REDD+ projects is constrained both by the high risk perception of long-term investment in developing countries**, and by a limited capacity to absorb investment in many forest nations.

In order to attract private capital, forest nations must identify REDD+ opportunities within the context of a national plan. A strong and stable policy framework is required to catalyse markets for sustainable products and for environmental services, including carbon. Additionally, the private sector will require the provision of **targeted financial support** that mitigates some of the risks associated with long-term investment in developing economies.

4.3.2 The investment profile

From the perspective of private sector financing, REDD+ poses the following challenges:

- ***Scale***: The underlying drivers of deforestation are economic in nature and the extractive use of forests is an important feature of the economy in many forest

nations. In global terms, the forestry sector provides around 1.2% of GDP. In many developing economies forestry contributes up to 5% of GDP rising to more than 10% in some of the poorest countries. This excludes other economic activities, such as agriculture, which contribute to deforestation[14]. To counter economic drivers, the current low levels of investment in REDD+ will need to be substantially uplifted;

- **Risks**: Deforestation takes place in regions which are generally perceived as high-risk from investment perspective due to relatively weak institutions and regulatory frameworks;
- **Timeframe**: Some REDD+ investments, such as planted forests, have long investment timeframes and therefore significant quantities of patient capital are required;
- **Non-traditional**: Funding the conservation of forests falls outside traditional forms of private sector investment strategies.

Private sector investors in REDD+ projects will seek to work with **reliable local operators** who have good in-country knowledge, and who can deliver to a certifiable and high quality standard. They will require good title to land or land-use rights. Furthermore, investors will generally seek early cash-flow from investments, which facilitates liquidity.

This section focuses on **ways in which the private sector can contribute to financing REDD+** and describes instruments and mechanisms that could be used to address these challenges.

Throughout, reference is made to REDD+, rather than REDD, as this encompasses the dynamic role of forests in sequestering carbon, as well as the prevention of greenhouse gases emissions.

4.3.3 Role of the private sector

To deliver REDD+, forest nations will need to identify investment opportunities and foster partnership of private sector operators who have local know-how with international investors with capital. Investing in REDD+ can deliver attractive returns in many cases – yielding financial as well as environmental dividends.

The private sector can potentially take on a number of roles in REDD+. In forest nations local private sector participants will provide the mechanism through which investment is deployed in creating sustainable economies which are not reliant on extractive forestry. In the near term, it is likely that the majority of direct REDD+ investment would be limited to more traditional forestry assets such as sustainable forestry

[14] FAO, *State of the World's Forests*, 2007; P. Steele, M. Kragt, *Growth and Poverty Reduction: What Is the Role of Forests? Draft prepared for Environment and the Poverty-Environment Partnership*, 2006.

or planted forests. However, over time private sector investment will broaden as carbon markets develop to include accreditation for forest conservation.

Examples of private sector finance in REDD+ (in addition to potentially raising finance through forest-backed bonds, which are not the focus of this section) include:

- **Direct investment in sustainable commodity production**
  - Planted forests – which will provide sustainable timber resources;
  - Sustainable forest management – managing natural forests on a sustainable basis;
  - Forest-related renewable energy projects – relieving deforestation caused by fuel-wood collection;
  - Enhanced farming – improving yields, preventing deforestation for farmland.
- **Indirect investment through providing finance for REDD+**
  - Co-investment with development banks in pooled REDD+ projects
- **Direct investment in financing conservation projects**
  - Investing in conservation projects which use carbon finance or other mechanisms to become self-sustaining.

Over time, REDD+ could attract significant interest from international investors. Pension funds and endowment funds already invest in sustainable forestry and forest plantations and have the potential to make significantly larger commitments. Forestry and land-based investments make sense for institutional investors as they have relatively predictable returns (which tend to rise in line with inflation), and derive value partly from biological growth.

4.3.4 Risk profile

Although REDD+ projects already attract some private sector participation, investment flows are insignificant compared to those required to effect the economic transformations necessary to halt deforestation. As an illustration, Uganda estimates that it needs investment in 500,000 hectares of sustainable planted forests to meet its future demand for timber alone. At a (low) planting cost of $1,000/ha this implies an investment requirement of $500 million. Currently annual planting rates are less than 5,000 hectares.

The world's largest institutional investment market for forestry is in the US, including more than $30 billion invested in Timber Investment Management Organisations (**TIMO**s). Less than 20% of TIMO investment is overseas, with most of this in investment grade economies[15]. Paralleling underinvestment in tropical forestry by the private sector, less than $1 billion a year has been made available for tropical forestry through Official Development Assistance[16]. Factors which contribute to this underinvestment stem from a

[15] Global Forest Partners LP, internal research, presented at International Forest Investment Conference, London 2008.
[16] The Prince's Rainforest Project, *An Emergency Package for Tropical Forests*, 2009.

number of market failures. In particular, in the context of forestry, they include (perceived and real) carbon market, political and operating risks, as well as inadequate access to banking finance:

- **REDD+ carbon market risk** – there is substantial uncertainty regarding the regulatory features of a future REDD+ carbon market, as well as the potential role for the private sector if and when it is created. Key issues include: market mechanisms, price expectations, and what REDD+ encompasses. Without certainty on long-term REDD+ revenues, it will be difficult for the private sector to evaluate investment opportunities and, at the same time, for forest nations to implement the required wide-reaching political reforms.

- **Political risk** in forest nations – REDD+ will require political commitment to wide-ranging reforms which may include: land tenure; regulatory frameworks; tax treatment; enforcement of laws; and strengthening of human rights. Reforms could be undermined if REDD+ does not deliver economic benefits, or if social unrest develops. As many REDD+ projects are land-based and require the active cooperation of local communities, local politics constitute additional risk factors.

- **Operational risk** – REDD+ projects generally carry low technology risk, but require operational expertise, especially in land management. Sourcing qualified personnel and managing logistics in remote regions will be a challenge for project managers.

- **Financial risk** – REDD+ projects hosted in developing economies carry financial risks relating to local currency and interest rate movements, and counterparty creditworthiness. Furthermore, REDD+ projects such as sustainable forestry or agriculture will be largely dependent on revenues from domestic markets. Local economic conditions will heavily influence prices, and sustainably produced products may face competition from unsustainable sources.

- **Emissions accounting risk** – the net long-term carbon effects of REDD+ projects such as sustainable forestry or agricultural improvement are not well understood and need to be researched.

- **Length of the investment cycle -** Investment in long-term REDD+ projects, such as planted forests, requires patient capital, as revenues may take many years to develop. Although profits could be attractive in the long-run, investor appetite is currently limited in many countries, as the risk factors described above are magnified given the period of time investor capital is tied up. Additionally, financial markets are under-developed in many forest nations and even large-scale enterprises find bank loans or equity finance expensive, or impossible to obtain for long-term projects. This is compounded for many small-scale farmers or businesses which operate outside the formal economy.

The risks and investment barriers outlined above create an **'investment gap'** between an investor's required return and that available from the REDD+ project. This gap could be closed through provision of targeted financial assistance from development banks delivering on a REDD+ mandate. Such finance would produce a leveraged effect as it would stimulate private investment flows, as the following sections will explain.

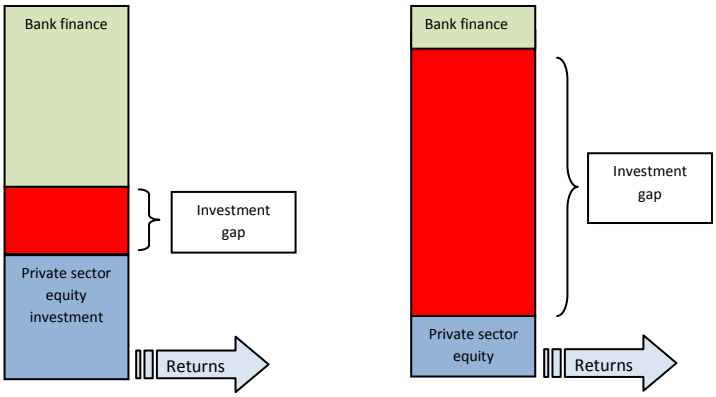
4.3.5 Role and channels for government intervention

The investment gap

In most cases REDD+ investment will earn a return. The investment gap relates to the difference between the amounts of money that could be raised from private sector investors (given the investment returns available) and bank finance, and the total amount required for a project. Investors seek greater returns where risks are perceived to be highest (e.g. in low-income countries), and fewer investors will have appetite for projects with delayed returns (e.g. planted forests).

Figure 6 - The investment gap in different forest nations

Same project, same returns: the investment gap may be relatively small in countries with low perceived risks (left). Where perceived risks are higher, less bank finance is available and private sector investors will commit less equity for the same returns – the investment gap is greater (right)



The investment gap can only be bridged with the assistance of governments and multilateral institutions. Over time, particularly as carbon finance becomes central to project returns, REDD+ projects will generate operational and financial track records and a wider range of investors will be able to participate, thereby reducing the ongoing need for financial assistance. In the meantime, a number of **potential solutions** exist for reducing investor risk and accelerating private sector investment into REDD+, as set out below.

Regulatory frameworks and policies

While participation of private sector investment in REDD+ will substantially reduce the public bill, it should not be expected to fully fund REDD+ in the short- to medium-term: the risk associated with **putting in place an appropriate regulatory framework** (as well as catalysing financing, as discussed below) should be covered through public interventions. However, by engaging the private sector, innovative mechanisms will be established that will channel more investment over time, with the private sector taking on an increasing share of the investment burden and the associated regulatory and other risks.

In order to deliver REDD+, forest nations will need to take action (supported through purely public financing) to transform their economies from the extractive use of forests to sustainability. This will require **wide-reaching, country-led policy shifts and capacity building** that will impact the livelihoods of many people directly or indirectly. More than 1.8 billion live in tropical and sub-tropical forest biomes, and of these 1.2 billion live in rural areas[17]. Each country will need its own REDD+ **policy strategy**, targeting local drivers of deforestation and identifying investment opportunities. For example, in one region the policy focus might be on replacement of fuel wood, whereas in another it may be on improving agricultural productivity. As REDD+ takes effect, more forest can be conserved and more people will be assured livelihoods without causing deforestation.

There are many initiatives funded by donor governments that are designed to prepare developing forest nations for REDD+. These include institutional capacity building, monitoring and pilot projects as well as a strong emphasis on forest protection. However, if financing is applied solely to conservation, law enforcement and other policies, it is likely that rural economies will stagnate, demand for commodities will be unfulfilled, and pressure to reverse REDD+ will increase. To avoid this outcome, **it will be paramount for rainforest countries to create appropriate and comprehensive plans, in the context of their existing growth strategies, to catalyse private sector involvement in REDD+**.

Amongst the key regulatory and policy measures aimed at strengthening the private investment environment, Governments should therefore support:

- Clarification on how **international accounting standards** are applied to land-based projects, including forestry and those that generate REDD+ credits. International investors will seek consistency in accounting methodology and valuation across geographies. International Accounting Standard 41 (IAS 41) sets guides for land-based agricultural and forestry asset valuation. However, as highlighted in a recent

[17] ASB Partnership for the Tropical Forest Margins.

survey by PWC there is significant divergence in interpreting the guidelines, resulting in inconsistent valuations[18].

- Investment in international centres of excellence for **education** in land management, forestry, horticulture, accounting and resource management for nationals of host forest nations;

- Long-term **research programmes** to establish the best REDD+ strategies, and net carbon effects of REDD+ investment; and

- **Engagement of businesses, NGOs and other opinion formers** to derive consensus on appropriate strategies to achieve REDD+, including on issues of land tenure, role of the private sector, role of the carbon markets and others.

Public financing mechanisms

In addition to the underlying regulatory and policy frameworks which act to incentivise enhanced action on REDD+ generally and by the private sector specifically, public financing mechanisms will also need to be deployed to ensure private sector finance for REDD+ is mobilised successfully. It must be stressed that stimulating private sector participation in REDD+ **does not require financial innovation**, but it does require a committed focus and ambitious targets. The challenge will be to make REDD+ finance accessible to all strata of private enterprise, and deliver on a REDD+ mandate in a timely way.

► Delivery channels

Meeting the investment gap could be assisted by the **development banks providing finance and risk-mitigating services in partnership with local financial institutions**. The MDBs' regional expertise and convening power could ensure a catalytic role in what remains an underinvested area of climate change. The delivery of the financing could be achieved both through existing MDB programmes and through targeting REDD+ financing facilities. REDD+ finance could be particularly effective in reducing deforestation in Brazil and Indonesia, which together contribute over 50% of the world's forest-related emissions. The investment gap in these cases is relatively narrow as both countries have well developed financial systems and active planted forest sectors. Targeted finance could catalyse substantial private investment, thereby meeting climate change targets at much reduced public cost.

[18] PWC, Forestry *Industry, Application review of IAS41; Agriculture: the Fair Value of Standing Timber*, 2009 (www.pwc.com/fpp).

► **Instruments**

By focusing on the provision of financial assistance to fill the investment gap, donor governments could achieve a leveraged effect through stimulating private sector investment in commercial projects, such as sustainable forest management or planted forests, which reduce net deforestation. In most instances this could be delivered through the enhancement of existing mechanisms, making finance more accessible and ensuring that it is taken up for REDD+ investment. **Financial facilities (most easily delivered by the MDBs) could include:**

- **Insurance** for political and land tenure risks. Insurance provided by a development bank (such as World Bank's MIGA) provides security for investors as invested capital can be protected against losses that may arise from exogenous factors, such as political violence, expropriation, or embargos. Insurance provision by a development bank is attractive because of the influence that a development institution can bring to bear in resolving disputes. Such insurance has a considerable leveraged effect as its provision does not require large capital commitments, but could be used to attract equity investment to REDD+ projects in regions where political uncertainty currently deters investors. MIGA currently has about $1billion of shareholder equity on its balance sheet, and a current exposure of around $7 billion[19].

- **Debt provision**. Debt finance can be used to fund projects which generate predictable cash flows (e.g. planted forests). Debt providers bear lower risks than equity investors, because they rank as senior obligors and may be secured against certain assets.

- **Credit enhancement**. Credit enhancement (or guarantees) can be used to mitigate local currency debt exposures thereby improving credit quality and facilitating access to banking or trade facilities. Such facilities are provided by GuarantCo, a public-private institution supported by DFID (UK), SECO (Switzerland), SIDA (Sweden) and the Dutch Ministry of Foreign Affairs. However, this facility is relatively small at just under $80 million at end-2008) and is not targeted at forestry. Credit enhancement is analogous to insurance and it can have a considerable leverage effect.

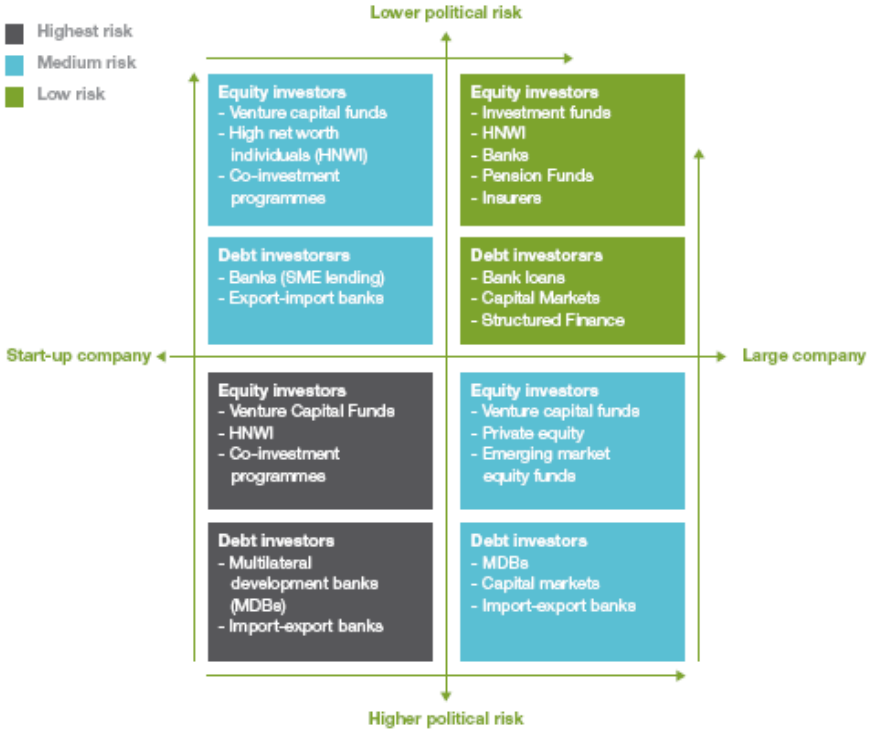
[19] Forum for the Future, *Forest Investment Review*, 2009. UNEP and Partners consider how MIGA might be expanded to provide support for the move to the low-carbon economy (See UNEP & Partners Report by Vivid Economics, *Public Finance Mechanisms to scale up private sector investment in climate solutions*, October 2009).

- **Equity co-investment**. Private sector investors may accept lower returns if co-investing alongside development institutions. Such equity co-investment is attractive because development institutions are perceived to wield political influence which could help the commercial success of a project because political risks would be diminished.

Uganda's experience in attracting forestry investments

Uganda has started to attract inward investment in forest plantations. New Forests Company (Uganda) Ltd. (NFC) was established in 2004 and has become the largest tree planter in Uganda with more than 6,000 hectares of pine and eucalyptus planted to date. It received initial investment from individuals and subsequently closed an equity investment of $8.5 million from HSBC and a loan facility from the European Investment Bank of c$6.5 million. NFC expects to produce timber for transmission poles and construction as the main flows of revenue.

Figure 7 - Larger companies in stable economies attract a broader range of investors



Source: Eco System Services Limited, Forum for the Future, Forestry Investment Review, 2009

► Innovative carbon finance

The private sector has demonstrated innovation and entrepreneurship in developing new financing mechanisms that fund forest conservation ahead of international agreements on REDD+. Examples include community-based conservation in Amazonas (sponsored by the Marriott Hotel Group) and the sale of ecosystem services derived from the Iwokrama International Centre in Guyana. These show how innovative carbon finance can be used to generate funding outside of existing frameworks for REDD+ and forest conservation. The key advantage of such pioneering carbon market (or ecosystem services) initiatives lies in the fact that it significantly reduces the requirement for public financing. For example, in the case of ecosystem services, if the underlying agreement between the private sector entity monetising the payments for such services and the government in which the forests are located are structured appropriately, revenues derived from the sale of such services will become available for investment into further conservation activities or broader community benefits. Instead of being something standing in the way of progress and development, thus, forests can become a vital underpinning of the economy.

The Peruvian experience

Payment for ecosystem services is already established in several countries and recently the Peruvian Government launched a scheme that pays communities for preserving the Amazon jungle. The 'Let's Conserve Together' programme will be implemented in 2010 and plans to pay settlers approximately $3.30 per hectare per year for conservation. The German Government has contributed $7 million and Japan has made a low-interest loan to Peru which will help fund this initiative.

The Guyana experience

In March 2008 a UK company, Canopy Capital Limited, bought a 5 year licence (in effec option) to market ecosystem services for the Iwokrama International Centre in Guyana. ecosystem services include rainfall production, water storage, weather moderation, biodiversit well as carbon storage and sequestration. Canopy Capital is attempting to create a marke ecosystem services through the listing and sale of ecosystem service certificates deriving Iwokrama through the Chicago Climate Exchange. Such an initiative could create a benchmar pricing the natural capital of rainforest. Countries with low rates of deforestation could revenue to conserve forests, and perverse incentives to initiate deforestation would be avoi Canopy Capital is seeking ways to underwrite a minimum price floor for traded certificates. would provide investors with confidence and would help fast-track investment into forests ahea agreement on an international framework. Such a guarantee would help foster private investme rainforests as cost-competitive CCS utilities. The terms of the Canopy Capital agreement pro for revenue-sharing with up to 90% of investment upside going to Iwokrama. Proceeds of any of ecosystem services will be invested in supporting Iwokrama's 370,000 hectares, providing enhanced livelihoods of local communities, and making contributions to President Jagdeo's L Carbon Model of Economic Development.

4.3.6 Recommendations

REDD+ presents many opportunities for private sector investment and, over time, could become an engine for economic growth in forest nations. Unless REDD+ is seen to deliver higher standards of living it will be unsuccessful in the long-term.

The challenge will be to catalyse private investment in REDD+ projects, putting the production of agricultural and forest-based commodities onto a sustainable footing, and conserving the ecosystem services provided by standing forests, especially their natural carbon capture and storage function.

Given the current regulatory uncertainty over REDD+, the primary goal should be to create a shared, simple and stable regulatory framework for using forestry as a key tool to reduce emissions. Despite the significant progress in the forestry-related negotiations, it is likely to be several years before a functioning REDD+ market is in place. Nevertheless, REDD+ projects can be funded in the near term, through partnership of governments and the private sector.

To stimulate early private sector involvement in REDD+, the following is required:

- **Targeted debt and provision of other forms of public financing from MDBs**, delivering on an ambitious mandate to finance REDD+, could assist with reducing the investment gap for REDD+**.** Such finance could include standard debt, concessional debt, political risk insurance and credit risk guarantees;

- Creation of **country-specific plans** that identify root causes of deforestation, together with REDD+ investment opportunities;

- Provision of support for **innovative projects** in the area of **carbon finance and payment for ecosystem services** that could attract wider private sector investment in reducing deforestation and conserving forests;

- Creation of an **enabling environment for REDD+ through engaging business**, NGOs and other opinion formers to derive consensus on appropriate strategies. This should be supported by investment in education, research and training, as well as clarification on how **international accounting standards** are applied to land-based projects, including forestry and those that generate REDD+ credits.

4.4 Adaptation

Authors: *Tamsin Ballard, UK Department for International Development (DFID); Christopher Bray, Barclays Bank; Maya Forstater, AccountAbility; Guy Howard, DFID; Mandy Rambharos, Eskom; Sunny Sehgal, HSBC; Simon Zadek, AccountAbility*

4.4.1 The challenge

Even if dramatic reductions in greenhouse gas emissions were made immediately, inertia in the global climate system means we would still have to acclimatise to rising temperatures, changing rainfall patterns, changes in extreme weather events and centuries of sea level rise. Adapting to these changing climatic conditions entails **adjustments in practices, processes or structures**. Regional exposure to impacts such as drought, flood, desertification, ecosystem destruction and infectious disease, combined with dependence on climate-sensitive sectors such as agriculture, fishing, and tourism are key risk factors. This exposure is exacerbated by minimal access to technology, credit and markets, weak institutions and infrastructure, and overarching levels of poverty in some developing countries. Small island states, least developed countries and mega-delta cities are at particular risk.

A broad range of climate sensitive investments planned under public expenditure, development cooperation and private ventures in developing countries are likely to be **sensitive to climate change impacts and risks**. Equally, growing adaptation demands will create **investment opportunities** and new markets for climate-adapted products and services. Driven by the interconnectedness of global trade and finance, many businesses in many sectors across the world will be impacted by climate change. Some businesses will benefit, others will be adversely affected.

The costs of adapting to these climate changes in developing countries are uncertain due to weak data and diverse definitions of adaptation action and methodologies used but could be as high as $86bn already by 2015 with costs expected to escalate beyond 2030[20]. What is clear is that the scale of ongoing economic activity which will need to be reoriented to the realities of a warming planet is much greater than the fraction captured in these cost estimates identified as the basis for public funding.

Despite the materiality of adaptation risks and opportunities to the private sector the debate within business circles has focused almost exclusively on the mitigation of greenhouse gas emissions and the business impacts of carbon constrained economic growth. Similarly, **international debate on adaptation policy has ignored the impact and role of the**

[20] UNDP, *Human Development Report - Fighting Climate Change: Human Solidarity in a Divided World*, 2008; M.Parry et al., *Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates*, 2009.

private sector and concentrated on government needs and responsibilities. This imbalance needs to be redressed.

4.4.2 The investment profile

It is clear that the **majority of adaptation actions will need to be undertaken by private actors**[21]. Their risks and opportunities will differ within and between countries and sectors and different types of businesses. This includes the thousands of small and medium enterprises, formal and informal, that make economies in developing countries function, as well as large national and multinational corporations. There will be hotspots of risk to major economic assets, infrastructure and services that underpin business, access to markets and market base (consumer's disposable income), as well as production and supply chains. For example, the revenues of many of Ghana's small and medium businesses were damaged when low water levels resulted in power cuts in 2006 (hydropower facilities account for 60% of the country's power), while the electricity outages threatened mine closures and increased operating costs[22]. A key challenge will be managing the uncertainty over the location, scale, and timing of climate impacts and thus the type, extent and timing of adaptation that is required.

There will be also **substantial need for direct public investment in adaptation**, as the long timescale and the shared benefits associated with adaptation infrastructure implies that often private benefits will be lower than the social benefits generated by such infrastructure, causing underinvestment.

Business risks from climate change

Businesses will need to respond and adapt to a wide range of **risks to their value chain** from climate change[23]. This may in turn impose **substantial costs** on existing business models, and operating, maintenance, repair and decommissioning costs. For example, utilities and small water supply operators will need to improve water management and reduce losses, and some may need to develop new sources of water, build new water transfer systems and employ new technology. Assets may depreciate faster than anticipated in financial projections and asset operating lives may be shortened with implications for company value. For example, much of the investment in the power sector over the next two decades, estimated at an annual cost of US$1 trillion per year, will need climate-proofing over and above the need to mitigate carbon emissions. The same is true of the estimated

[21] OECD, *Economic Aspects of Adaptation to Climate Change: Costs, benefits and policy instruments*, 2008.
[22] Acclimatise and Synergy, *Climate Finance, Business and Community: The Benefits of Co-operation on Adaptation*, 2009.
[23] Details can be found in Acclimatise and Synergy (2009), supra.

US$500 billion needed in the water sector to meet MDG targets[24] and the US$1 trillion of private sector participation in infrastructure investments made in developing countries over the past two decades[25]. Climate change may also impact on a **project's ability to attract insurance and refinancing in the future**, while community tensions and conflicts over access to land, water and energy resources may be exacerbated leading to project delays, loss of output, reputational damage and loss of social licence to operate. Costly **litigation** may ensue.

Business opportunities from adaptation

New business opportunities will also be presented as households, businesses and Governments adapt to a changing climate. For example, climate change will impact the distribution of some diseases requiring the pharmaceutical sector to both expand their existing product portfolio and invest in R&D to find new solutions to new challenges, as recognised by GlaxoSmithKline[26]. Intensified climate change impacts over time will require innovation to develop more effective and **new technologies, business models** and **ways of sharing risks**. Innovative insurance products are already emerging with reinsurance companies such as Swiss Re and Munich Re working with intermediaries to develop risk transfer products ranging from micro-insurance for small farmers to natural catastrophe insurance for Governments[27]. There will also be opportunities for investments in **mitigation activities that generate ancillary adaptation benefits**, and vice versa, such as sustainable forestry that contributes to carbon storage as well as maintaining resilient ecosystems and regulating water volumes and quality.

Progressive businesses are recognising their growing adaptation needs and opportunities and are operating to tackle these already. For example, Unilever, SABMiller, Coca-Cola, Alcoa, Rio Tinto, Shell, BP, DuPont, and PepsiCo have developed strategies to manage the 'water footprint' of their sourcing and manufacturing operations and improve watershed protection and management through payment for watershed services to upstream farmers and land-users[28]; and BHP Biliton has worked in partnership with a multi-government malaria control programme to successfully tackle malaria that threatened their labour force and thus their operations in southern Mozambique[29]. How companies manage their climate-

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[24] H.Hutton and J.Bartram J., *Regional and Global Costs of Attaining the Water Supply and Sanitation Target (Target 10) of the Millennium Development Goals*, 2008.

[25] These infrastructure investments were made between 1990 and 2006, as documented in OECD (2008), supra.

[26] http://www.gsk.com/policies/GSK-on-health-and-climate-change.pdf.

[27] UNEP FI, *Green Paper: Financing a Global Deal on Climate Change*, 2009.

[28] UNFCCC Nairobi Work Programme- Private Sector Initiative.

[29] Acclimatise and Synergy (2009), supra. While BHP Biliton's response was not driven by climate change-induced malaria it provides an illustration of how companies have effectively adapted to the types of growing risks anticipated by a changing climate.

related risks and respond to the opportunities could in turn enable or undermine the adaptive capacity of the local stakeholders they interact with, from workers and consumers to neighbours. This in itself can generate a second round of business risks and opportunities[30].

4.4.3 The role of the private sector

The role of the private sector in adaptation is crucial to the public interest in four areas:

- **Supporting climate-resilient growth and livelihoods** and addressing 'the adaptation deficit' in developing countries. Private sector development (formal and informal) is crucial to securing ongoing economic growth, employment – supporting 9 out of 10 jobs in the developing world - and livelihoods which in turn are critical in building a populations' overall resilience[31]. Encouraging and facilitating private-sector driven growth and opportunities to be climate resilient should therefore be a core element of a country's adaptation strategy.
- **Meeting growing demands for innovative solutions to adaptation challenges** and promoting their adoption. This should include responding to business strategies to profitably serve the adaptation needs of poor people as well as wealthier consumers.
- **Delivering and enhancing provision of public adaptation projects** through public private partnerships and other procurement relationships (e.g. flood barriers), helping Governments to overcome their operational constraints, enhance performance and service quality, and accelerate investment[32].
- **Avoiding private sector maladaptation and addressing negative impacts on communities' resilience.** In addition to these positive contributions, businesses' action can result in maladaptation such as building in flood plains, deforesting mangroves, or depleting local water resources. These actions serve to increase their own or others' vulnerability to the effects of climate change. Legitimate decisions to reduce business exposure to climate risks, such as through shifting location and sourcing can also impact on dependent communities. Businesses will need to be responsible for managing the environmental risks in their areas of operations.

If adaptation, and the socially contingent second-round of risks and opportunities, are recognised and incorporated in businesses' assessment of material risk, driven by self-interest the private sector can play a pivotal role in enabling communities to adapt. This means both taking responsibility where business actions increase the vulnerability of others

[30] Acclimatise and Synergy (2009), supra.
[31] DFID, *Private sector development strategy*, 2009.
[32] OECD (2008), supra.

and addressing the broader adaptation needs of developing countries through its expertise, capital and capacity for management, risk sharing and innovation.

Despite signs of action, to date the private sector has been slow to react. If the private sector is to contribute adequate effort to the challenge of adaptation, it must now step up with real commitment, understanding and responsiveness to this material issue as a principle of good governance.

4.4.4 Barriers to private sector investment in adaptation

Despite there being private adaptation actions with relatively low costs and high private benefits[33], few businesses have recognised the full commercial implications of a changing climate. Even those that have demonstrated leadership are a long way from up-scaling business solutions to meet global needs. Key barriers to private action, which will vary between different or, if the same, of different degree between sections of the private sector operating in developing countries include:

► **Lack of awareness, engagement and pressure**

- Adaptation is perceived as too complex, uncertain and distant an issue, with adaptation risks and opportunities not yet recognised as material issues or incorporated in enterprise risk management systems. Consequently there is a lack of pressure by investors. This is compounded for small-scale businesses by resistance to changing traditional practices.
- Lack of business engagement in policy debate since adaptation is not seen as a business issue (with some businesses only seeing this as an 'add-on' in terms of Governments expecting funding from businesses for adaptation purposes) nor do Governments necessarily see the role of business in the adaptation discussion. The result is a gap in policy makers' understanding of the potential for business action, the obstacles faced and the policies needed.

► **Poor business environment**

- Familiar obstacles to doing business are also obstacles to adaptation. Corruption, restrictive and overly bureaucratic processes, lack of access to infrastructure, transportation and capital and barriers to trade all prevent businesses adapting to changing risks and opportunities, whether climate related or from other sources.

[33] Swiss Re/McKinsey & Co/GEF *Shaping Climate Resilient Development – A Framework for Decision* Making, 2009.

- Pervasive political opposition from well-connected companies that may use their political power to block changes for robust adaptation policies that will reduce their rents. For example, energy costs for irrigation are kept artificially low because farmers represent a powerful political bloc in India resulting in an unsustainable use of groundwater.
- Obstacles to enterprise resilience for small-scale farmers and informal sector businesses that lack the resources, expertise and risk appetite to take up new technologies, products or services that would strengthen livelihoods. Equally, markets focusing on their adaptation needs are nonexistent or too 'thin' to function properly.

► **Market failures**

- A lack of 'loss history' and poor information to price the risks faced prevents insurance and other adaptation-based markets from developing. Pricing incentives from other sectors may also affect climate sensitive sectors, as with subsidised energy and inefficient water use.
- Ill defined property rights over natural resources and services that are not valued properly in the market (water, forests, ecosystems etc) provide private agents with no clear signal about the increased scarcity of these resources or of their higher economic benefits, resulting in an under-investment in adaptation.
- Some private adaptation measures can generate positive and negative externalities that are not reflected in the market price and therefore under or over produced. A rational adaptation for one company can result in maladaptation when aggregated across a larger area e.g. one company's efforts to redirect storm waters can flood out its neighbours.

4.4.5 Leveraging Business for Effective Adaptation

Governments have the incentives and tools to help overcome barriers and mobilise private sector adaptation that is in the broader social interest. This includes both ensuring that large companies, with access to international finance flows, include climate risks in their due diligence and have the incentives to develop the necessary capabilities to respond, as well as supporting SMEs - the backbone of employment and livelihoods in developing countries - to overcome barriers to adaptation. The public sector can also help to develop markets for key adaptation services and attracting private investment into new supply chains that target poor peoples' adaptation needs with accessible, available and affordable products and services.

Governments should use a mix of policy instruments and public spending to address the causes and effects of private inaction and target private engagement across three tiers:

- **Influencing private adaptation that *will* occur** and can generate positive or negative externalities. These actions should be autonomous and do not have to be funded or directed by a public authority but may require some public intervention.

- **Mobilising private adaptation that *could* occur** and generate wider adaptation benefits but is discouraged due to problems such as high risks, high transaction costs, and short time horizons of investors. Consequently private agents may resist adopting or developing new practices or only address the needs of wealthier consumers. This would have a regressive distributional impact, and hence public intervention may be justified.

- **Partnering to deliver public support where private adaptation *will not* occur** but where private agents can help Governments overcome operational constraints, enhance performance and accelerate investment in public adaptation support**.**

Public policy

► **Raising awareness and capacity:**

- Coordinating and providing locally relevant information, and ensuring it is accessible to enable businesses to understand the commercial implications of changing weather patterns, costs of not acting, and the full range of benefits from adapting to a changing climate. This will assist companies in building their capability to understand the issue and in focusing their attention on adaptation needs.
- Coordinating and providing locally relevant information and making sure it is accessible to consumers to help address political will constraints and the cost element of business adaptation, as informed consumer bases tend to be more willing to pay more for resilient and reliable supplies of products.
- Globally on lessons learnt and metrics developed for leveraging business in support of effective adaptation and incorporating these measures into assessments of national competitive environments to support cross-sector and cross country learning.

► **Engaging private stakeholders:**

- Involving the private sector in the development and delivery of national low carbon-climate resilient development strategies.
- Engaging with trade associations and sectors that are instrumental in leveraging others to implement climate adaptation measures as effective focal points. This

should include the formal financial sector and the micro finance sector given the volume of funds they can source, and multinational companies where they can assist their suppliers and distributors to implement adaptation measures as part of their business relationships.

► **Creating a suitable enabling environment** including:

- Regulatory incentives such as voluntary or mandatory disclosure of adaptation related risks to encourage due diligence (e.g. through the Equator Principles) and voluntary standards for public procurement agencies in establishing criteria and processes that sensitises public procurement to adaptation needs.
- Encouraging industries and private companies to integrate adaptation needs into their risk management and due diligence systems, governance, and public disclosure of risks in their operations and supply chains, and to include the value of ecosystems and biodiversity value in their own accounting and risk weighting.
- Price signals and environmental markets to ensure ecosystems and biodiversity are appropriately valued and address perverse pricing incentives.
- Research and development incentives.
- Continuing to secure general enabling environments for business growth through national regulatory reform, such as simplification of business registration procedures and development of rural infrastructure, and international trade openness.

Public spending and funding mechanisms

► **Using public resources to stimulate market systems including:**

- Investment in public goods that yield societal benefits such as infrastructure where the long timescale and shared benefits prevent private innovators capturing the full return of their investment causing underinvestment.
- Coordinating and investing in research and knowledge, including provision of robust climate data and modelling to help reduce the uncertainty of projected changes in weather impacts. This will help climate resilience to be incorporated as a mainstream business risk which in turn could be more readily incorporated into traditional business decision making. Similarly, research to help position the value of ecosystems and biodiversity within macro and micro economic systems will help to address market failures around ill-defined property rights (e.g. work currently underway on the Economics of Ecosystems and Biodiversity (TEEB)).

► **Using innovative funding mechanisms including:**

- Leveraging national and international business finance and innovation through mechanisms such as national Challenge Funds to encourage co-funding by businesses developing adaptation solutions that are relevant to the local context; and exploring new models such as a regional fund of funds (otherwise known as "cornerstone funds") mechanism for adaptation (which could be consistent with the Challenge Fund).
- Promoting the development, piloting and scaling up of affordable climate-insurance products in developing countries, in particular targeting the needs of micro and small enterprises. This could be undertaken through the establishment of an Enterprise Climate Insurance Facility that could build and draw on the range of insurance proposals currently being developed. While the precise mandate and breadth of interventions would evolve from the greater articulation of local, national or regional needs, a targeted Facility could help stimulate ideas and involve new players in providing affordable climate insurance services through provision of competitive innovation grants, encouraging businesses to bid to pilot or scale approaches that require an element of public support.
- Offering credit lines or concessionality to encourage commercial risk taking by improving the risk-return profile, in particular where adaptation will require capital intensive investment.

► **Public procurement including:**

- Accelerating development and deployment of adaptation technologies (building social objectives into contracts explicitly from the start) by developing more public-private partnerships in key services such as water and R&D.
- Developing criteria, policies and capabilities to ensure that public expenditure, especially procurement, encourages business to factor in adaptation-related needs[34].

4.4.6 Recommendations

The **majority of adaptation actions in developing countries will be undertaken by private actors**, from small-scale farmers to multinational corporations. Governments should strive to mobilise these agents and their actions by overcoming the barriers that exist, from lack of awareness to market failures. This is essential to secure a climate

[34] World Bank, *Managing Climate Risk Integrating Adaptation into World Bank Group Operations*, 2006.

resilient private sector and in turn the resilience of growth, employment and service delivery the sector generates and supplies. It is also important to capture opportunities to align private actions and investments with broader social adaptation interests and to enhance the scale and efficiency of government-led adaptation measures and investments. In practice, however, few businesses have recognised the full commercial interests of a changing climate and Governments have yet to understand and promote private sector adaptation needs and prospects. The combined effect is a lack of action. **If Governments alone try and respond and address all the country's adaptation requirements, they risk generating a temporary and unsustainable supply of support, and creating a distortionary impact on markets and crowd out the private sector.**

The private sector now needs to step up to the challenge, starting with the integration of adaptation into the governance, due diligence and public disclosure of risks in their operations and supply chains, and by developing the necessary capabilities needed to respond to emerging opportunities to meet adaptation needs. This will need to be complemented through a **mix of national and international policy instruments and public funding** to effectively mobilise and leverage sufficient private efforts and action on adaptation. This includes maximising adaptation co-benefits from other public expenditures including public procurement and development assistance. This analysis will be complimented with forthcoming work pioneered by the World Economic Forum.