

**Investing in a Lower-Carbon, More Climate-Proof Future:
Options, Tools, Mechanisms**

**Background Paper on
Investment and Finance to Address Climate Change**

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8.1 Introduction

Investors pursue their own goals when they voluntarily choose to let others use their money. Most private investors seek profits. Most public investors seek to further the interests of the publics they represent. Options for identifying, creating and capturing opportunities where these different types of investors' interests overlap with those of a lower-carbon, more climate-proof future are the focus of this section.

Earlier sections of this report identify several key trends in the investment needed to put the world onto a more sustainable climate path, including the following:

- Between 2000 and 2030, the total investment being made in GFCF is projected to triple – emphasizing the need to make the most of the capital already available for climate-related investments;
- Large amounts of investment are already being made in climate-relevant sectors by domestic and foreign private investors in many parts of the world – underscoring the need to shift more of that investment over to lower-carbon, more climate-proof approaches; and

The amount of public and private money dedicated primarily to investments in a more sustainable climate future remain extremely small compared to the other sources of capital – highlighting the critical need to assemble more capital to focused on addressing climate change.

These findings suggest that the options for bringing more investment to a sustainable climate future fall into three major areas, namely:

- To ***optimize*** the application of the funds currently available for investment in lower-carbon, more climate-proof projects by spreading the risks across the private and public investors with the appetites to cover them.
- To ***shift-over*** to more sustainable climate options the traditional, continuing investments being made in key climate-related sectors by private and public investors; and
- To ***scale-up*** the pools of international private and public capital dedicated to investments in a more sustainable climate future.

Each of these areas is explored further below.

8.2 Optimizing Available Capital Across Risks And Returns

As shown in Section 7., large amounts of money, from many different sources, are already being invested in climate-related sectors. How these public and private funds are allocated across different projects depends on three major factors:

- The *sources of investment* being considered, as both public and private investors differ in their appetites for risk and return over time;
- The *technology/project* into which the investment is going, as different opportunities vary in the risks they present, both generally (technology risk) and as applied in particular locations (project risk); and
- The *host country* for the investment, as countries also vary in their attractiveness to investors (country risk).

Understanding the interplay among these different factors, and their implications for how different types of capital can be used to cover the risks facing different investments, is critical to attracting or driving more investments into a better climate future. Each of these areas is discussed below, before moving to suggestions for options the COP might consider to help optimize the use of currently available funds.

8.2.1 *Layering-In Across Sources – Opportunities for Partnerships*

No money is free. Each type of investor – public or private – has its own appetite for risk and reward over time. For example, and as discussed in Section __ above, private investors are seeking primarily private, financial returns, while public investors are seeking broader social returns. Likewise, no investment is free of risk – whether that be technology, project, country or other risks. The different types and levels of return sought by different types of investors, however, mean that they are willing to take on different types of risks. Some of the major differences in these appetites for risk and return over time are shown in Figure 8.1.

Table 8.1 Investment Appetites

Investor Capacity/ Appetite	Direct Public Investment	Grants		Debt		Equity	
		Public	Private	Public	Private	Public	Private
<i>Total Pool</i>	Large	Small	Small	Medium	Large	Small	Large
<i>Returns Sought</i>							
Social	High	High	High	High	Low	High	Low
Financial	None	None	None	Low	Medium	Medium	High
<i>Risks Taken</i>							
Project	Yes	Yes	Yes	Some	Little	Some	Yes
Technology	Little	Yes	Yes	Some	No	Yes	Yes
Country	Yes	Yes	Yes	Some	Some	Yes	Some
<i>Duration of Investment</i>	1-100+ years	1-5 years	1-3 years	1-10+ years	1-100+ years	3-7 years	1-100+ years

Source: Gentry, B. 2007.

As such, allocating investment risks across the parties/sources most willing and able to manage them is a key feature of successful investments in any sector. For example, investments in a wind farm in a developing country will often involve a mosaic of funding sources, including: private and possibly public equity in the ownership of the company sponsoring the project; private and possibly public debt for the construction of the project; and possibly public grants/insurance to help reduce the incremental costs or risks of the project. More broadly, a diversified portfolio of investments from a variety of sources, applied across a range of sectors and locations is required to help mitigate and adapt to climate change.

These investment partnerships – public-private, public-public, private-private – are the key to optimizing the funds currently available for investments in a more sustainable climate future. Many efforts are already underway to catalyze the opportunities for such partnerships. More can still be done. The following sections summarize some of the major trends in this area and offer some thoughts on ways to do more. First, a brief overview of how and why different types of investors are participating in these partnerships is provided. Second, more detailed looks at how these partnerships can help address key risks – technology, project, country – are provided.

8.2.1.1 Public sources

As described in Sections ___ (on sources of investment) and 7. (on 2000 investment in GFCF), the key public sources of capital for climate-related investments include the following. Each is focused on capturing the public benefits/social returns of most value to them. For each, some of the major risks they are willing to accept and rewards they are seeking when investing the funds they control are described. In addition, some of the implications for using these funds in climate-related partnerships are considered.

Domestic public capital is the largest source of public investment in GFCF (90% of total public capital, roughly US\$ 794 billion in 2000), mostly at the national level. National governments focus their investments on their most pressing development priorities. High social returns are sought, such as improved economies, expanded jobs, improved national security, better health and a cleaner environment. While they certainly take the risk that any particular project may not deliver its intended results, they often try to reduce that risk by applying more traditional technologies. A very long time-frame is often used to evaluate the returns from their investments. As such, domestic public capital tends to dominate the investment in long-lived assets providing a large degree of local public benefit in sensitive sectors. For example, 90% of today's investment in water resources comes from domestic public sources and 10% from external sources (public and private).¹ Other key sectors include transportation infrastructure, energy supply, coastal resources and natural ecosystems.

¹ Overview of Adaptation Investment Needs, Section ___ above, at [subsection 3.2.2]

International debt, mainly from multilateral (development banks) and bilateral (export credit agencies or ECAs) sources, is the second largest form of public investment in GFCF at 8% of total public capital (approximately US\$71 billion in 2000). These two pots represent very different appetites for risk and return over time, however. Development in the world's poorer countries is the focus of the Multilateral Development Banks (MDBs), while increased exports from domestic industries is the focus of the ECAs. As such, they apply their capital to very different types of projects. MDBs lend more to governments, while ECAs help finance more companies. MDBs also tend to have longer time-frames for their lending than do ECAs. Both, however, expect their investment principal to be paid back with interest (usually at rates lower than that required by private lenders). MDB investment in the climate area tends to focus on building the capacity of governments to adapt to and mitigate climate change, as well as providing incentives (such as guarantees) to attract more private investment into climate-friendly investments (see discussion below). ECAs tend to follow the interests of their exporters and customers, but some are now trying to offer more attractive financing for lower-carbon technologies (such as the 2005 OECD agreement to extend the allowable financing term for renewable energy and water projects to 15 years²).

Official Development Assistance (ODA) from bilateral sources is much smaller than either domestic public investment or foreign debt – representing 2% of the total public investment in GFCF in 2000 (approximately US\$16 billion). While ODA usually takes the form of a grant (so the money does not need to be paid back), the social returns sought are a complex mix of both the donor's and the recipient's national priorities. Grant periods tend to be relatively short, allowing for regular review and, possibly, replenishment of the funding.

The potential for applying ODA to more climate-related investments is complicated by the goal that ODA be focused on helping developing countries meet the Millennium Development Goals (MDGs), as well as the commitment by Annex I countries to provide “new and additional” resources to developing countries to respond to climate change (Article 4.3). ODA has been applied to adaptation, mitigation and capacity building projects in the climate arena.

Under the Climate Convention and the Kyoto Protocol, special funding sources have also been established for projects directly targeting climate change (see discussion in Section ___). While currently small in comparison to the other sources of public investment in climate change, these funds have demonstrated the potential to catalyze even larger investments given their sole focus on helping countries mitigate and adapt to climate change. For example, while the overall GEF allocation for its climate focal area was US\$ 1.8 billion between 1992 and 2004, combined with the co-financing that it leveraged, the GEF investments amounted to more than US\$ 11 billion during that period.³

² OECD Agreement on Special Financial Terms and Conditions for Renewable Energies and Water Projects, TD/PG(2005)19/FINAL, May 13, 2005.

³ UNFCCC Secretariat's 2005 Investment Paper at 42.x

8.2.1.2 Private sources

The key private sources of climate-related investment include those listed below. Each source is interested in capturing private, financial returns consistent with the level of risk it is willing to take. These appetites for risk and return, as well as the ways these different sources are already engaged with climate-related investments, are summarized below.

Domestic private capital is the largest source of private investment in climate-related sectors at 55% of the total private funding (approximately US\$3,245 billion in 2000). As with domestic public capital, local sources of private investment are adjusted to the country risks in their location and have first-hand knowledge of local markets. Their investment tends either to be as equity or debt, with some private philanthropic, grant-making capital available in some countries.

As debt, domestic private capital will seek to go to borrowers with demonstrated revenue streams (to pay back the loan with interest) and other assets (to be used as collateral in case the loan is not repaid). They will not want to take on many project or technology risks. Such risks are more likely to be borne by local sources of equity investment in the ownership of companies. As such, equity investors seek higher returns and provide their investment in a range of ways – from contributions of time or equipment, to the placement of billions of local currency units. The availability of domestic private capital varies dramatically across countries – both due to the levels of savings in the country, as well as the level of development of local financial markets.

Domestic private capital is used for a huge spectrum of climate-related investments, ranging from the acquisition of new types of seeds for agriculture to the construction of huge renewable energy facilities.

Foreign Direct Investment (FDI) is the largest foreign source of private investment in climate-related facilities – representing 25% of the private total (US\$1,540 billion in 2000). FDI tends to be made by multinational corporations seeking to establish a new base of operations for the medium to long term. As an equity investment, FDI seeks a higher rate of return than do most lenders. FDI investments relevant to climate change can range from those in polluting new production facilities to those in clean energy projects.

International private debt from private banks or the global capital markets makes up another large portion of the investment being made in activities relevant to climate change (20% of the total private investment, totaling US\$1,156 billion in 2000). Shorter-term debt is generally provided by commercial banks, covering periods from a few days to a few years. Longer term debt stretching over decades is provided by sales of bonds into the wider capital markets. As with all debt, the primary focus is on making finance available to established borrowers with a demonstrated capacity to repay the loan with interest. For example, the further down the development path a renewable energy project is, the more likely it is to be able to attract debt.

Carbon funds, while currently small compared to the other private sources described above, are growing rapidly. For example, the number of funds dedicated to investing in reducing emissions of greenhouse gasses has grown rapidly from three with capital of €51 million in 2000 to 54 with capital of over €6,250 million early in 2007.⁴ These funds often combine public with private capital to place debt or equity investments into emission reduction projects. As with the public funding under the Climate Convention and the Kyoto Protocol, their potential impact on climate change is great because their sole focus is on reducing emissions of greenhouse gasses in a cost-effective manner.

While not directly invested in GFCF, three other sources of private investment should also be mentioned. One, venture capital, is aimed at taking some of the risk associated with early stage technologies. The other, insurance, targets an even wider range of risks, including weather. Both of these sources are discussed in more detail below. Finally, private philanthropic capital is increasingly important in some sectors (health) and regions (Africa).⁵

8.2.1.3 Investment Partnerships

This large number of different sources of capital, with varying appetites for risk and return over time, creates a bewildering array of opportunities to bring different types of capital together to cover the risks facing any particular investment opportunity – particularly using the public sector’s focus on social returns to attract private investors in to activities that generate both social and financial returns. Not surprisingly, this means that different sectors have different allocations of investment capital.

For example, Figure 8.2⁶ shows the sources of investment in renewable energy and energy efficiency in 2005. Private investment is by far the largest source globally, with US\$ 28.2 billion of debt and equity out of a total of US\$ 29.3 billion. Multilateral and bilateral funding for renewable energy in 2005 amounted to US\$1.1 billion, less than 4 per cent of the total.⁷

⁴ See Section __ on the carbon markets, subsection [2.10].

⁵ Overview of Adaptation Investment Needs, Section __ above, at [subsection 3.3.2].

⁶ Overview of Mitigation Investment Needs, Section __ above, at [subsection 2.1.2].

⁷ Energy efficiency is not split out by CRS, the source for this data.

Figure 8.2 Overview of Funding Sources 2005 (US\$ millions)							
	Source	Renewable Energy		Energy Efficiency		Total	% of total
		OECD	Dev'ing	OECD	Dev'ing		
Total investment							
1 Debt							
Private sector	NEF	9,089	656	41	6	9,791	33.4%
Multilateral	CRS	-	386			386	1.3%
Total Debt		<u>9,089</u>	<u>1,041.5</u>	<u>40.8</u>	<u>6</u>	<u>10,177</u>	
2 Equity							
Total equity (private sector)	NEF	<u>14,107</u>	<u>2,906</u>	<u>1,342</u>	<u>96</u>	<u>18,451</u>	63.0%
3 Grants							
Multilateral (GEF)	GEF	-	42	-	30	71	0.2%
Bilateral	CRS	-	601			601	2.1%
Total Grants		<u>-</u>	<u>642</u>	<u>-</u>	<u>30</u>	<u>672</u>	
Total investment		<u>23,196</u>	<u>4,590</u>	<u>1,383</u>	<u>132</u>	<u>29,300</u>	
Private investment		23,196	3,562	1,383	102	28,242	96.4%
Multilateral / bilateral		-	1,028	-	30	1,058	3.6%
<p>Notes: New Energy Finance assumptions on leverage (debt as % of whole): VC/PE - VC all equity, PE for companies 30% debt, OTC/PIPE 10% debt; Public Markets - 100% equity; Asset Finance - balance sheet finance and lease/vendor finance 100% equity // bond finance 100% debt // project finance based on New Energy Finance standard levels of leverage (wind 74%, solar 77%, mini-hydro 70%, geothermal 70%)</p> <p>Private investment (as measured by New Energy Finance) is defined as investment made by financial institutions and corporates. It excludes public sector investment and R&D (whether funded by companies or governments)</p>							
Sources: As listed within table							

In 2005, private investment flowed into all of the major asset classes, namely Venture Capital & Private Equity (VC/PE)(in early stage technologies), Public Markets (portfolio investments in publicly traded shares), and Asset Financing (of projects, such as wind farms). Of the \$26.8 billion invested in renewable energy, \$2.9 billion was provided by VC/PE investors, \$3.8 billion was raised via the public markets, and \$20.1 billion was supplied through asset financings. As companies become more mature, investors can leverage their equity investment with debt. Asset financings typically involve 20-30 per cent equity and 70-80 per cent debt.

While the distribution of investments across sources of capital in renewable energy is instructive, no one approach to leveraging public and private capital will be able to address all of the needs in the climate arena. Rather, different mixes will be appropriate across the risks facing any particular investment project or initiative. How some of these opportunities are playing out in the areas of project and country risk are discussed below. This section then ends with a discussion of options the COP might consider for optimizing the use of these different sources in pursuit of a more sustainable climate future.

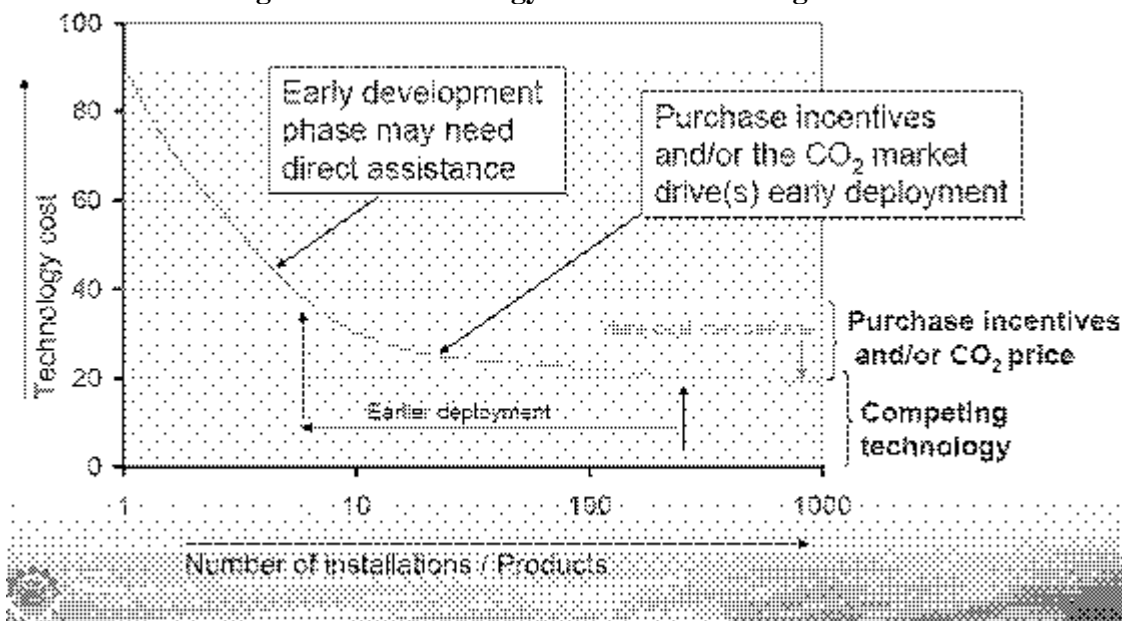
8.2.2 Layering-In Across Sources For Particular Technologies/Projects

While many of the technologies needed to help mitigate climate change are already available, new technologies still need to be developed⁸ and both existing and new technologies will need to be installed in new locations. Both sets of risks – general risks from the state of development of a technology (technology risk) and the specific risks facing the project into which that technology is deployed (project risk) – are being addressed by the range of investors described above. Some examples of how that is happening are provided in this section.

8.2.2.1 Sharing Technology Risks Among Public and Private Investors

Different technologies present different risks at different points in their lifecycle. As shown in Figure 8.3, early stage technologies often require some form of public R&D funding before a private venture capitalist may step in for commercialization. Even proven technologies may require a “carbon kicker” to help overcome higher initial or installation costs before the markets develop to the point that the technology is competitive with traditional technologies using conventional debt financing.

⁸ [cite to R&D paper and wedges discussion]

Figure 8.3: Technology Cost and Financing Curve

Source: WBCSD presentation at June 12, 2007 consultation with financial institutions

The process and financing of innovation varies radically across sectors.⁹ For information technology and pharmaceuticals, for instance, there are high degrees of innovation, with the private sector financing rapid technological change. In the power sector, the reverse is true: the same technologies have dominated for almost a century, while private R&D has fallen sharply. The significant increase in energy prices after the 1970s oil crisis went hand in hand with an expansion of R&D expenditures. The collapse in prices in the 1980s led to a relaxation of R&D initiatives and support. Recent price increases have so far not translated into a subsequent expansion of R&D. A number of reasons seem to be behind this. The liberalization of the energy markets in the 1990 and increased competition shifted the focus away from long term R&D towards the utilization of existing plants and technologies, particularly on combined heat and power or natural gas, rather than on R&D.¹⁰ Likewise, another important source of R&D expenditures in the 1970s – for nuclear power – has decreased dramatically, due both to public concerns about safety and waste disposal, as well as cost overruns which minimized their appeal to voters and policy makers.

In the U.S., federal funding for energy research has been steadily falling since 1980. R&D intensity (i.e., R&D as a share of total turnover) in the power sector was 0.5% compared to 3.3% in the car industry, 8% in the electronics industry and 15% in the pharmaceutical sector.¹¹ Likewise, a survey of eleven of the biggest energy R&D funders shows that public energy R&D spending worldwide has indeed stagnated, while private

⁹ Cite to R&D paper, Section II.2.

¹⁰ Nevertheless, in many countries the latter become obsolete with time or operate at below efficiency levels, as utilities struggle to support supply while not having the resources to replace infrastructure.

¹¹ Cite to R&D paper, Section II.2.

sector spending on energy R&D has also fallen.¹² In fact, total government expenditures of IEA member countries on energy R&D decreased from some USD 9.6 billion (at 2005 prices and exchange rates) in 1992 to USD 8.6 billion in 1998.¹³ This decline represents a less dramatic continuation of the trend already established in the 1980s. Since 1998, government expenditures have slightly recovered and were estimated to be USD 9.5 billion in 2005.¹⁴

The agricultural sector also sees a mix of public and private investment in R&D as shown in Figure 8.4.¹⁵ Public expenditures make up about two-thirds of the total, but are more than 90% of the expenditures in developing countries and less than half of the expenditures in developed countries. Thus, less than 10% of the private expenditures on agricultural research is in developing countries. Domestic public expenditures on research are substantially larger than the flows of ODA going in to the sector.

Figure 8.4. AFF research expenditures with public and private breakdown (millions 2000 USD) plus percentage shares

	Expenditures			Share	
	Public	Private	Total	Public	Private
Asia-Pacific	7,523	663	8,186	91.9%	8.1%
Latin America and the Caribbean	2,454	124	2,578	95.2%	4.8%
Middle East and North Africa	1,382	50	1,432	96.5%	3.5%
Sub-Saharan Africa	1,461	26	1,486	98.3%	1.7%
Developing-country subtotal	12,819	862	13,682	93.7%	6.3%
High-income country subtotal	10,191	12,086	22,277	45.7%	54.3%
Total	23,010	12,948	35,958	64.0%	36.0%

Source: Pardey and others (2006) as cited by McCarl.

Some of the technology-specific R&D needs identified in Section __ for investments in climate mitigation include the following

- Energy supply: renewable energy technologies beyond wind and solar; carbon capture and storage; next generation nuclear;
- Industry: energy monitoring and efficiency technologies;
- Transport: hybrid vehicles; biofuels; and more efficient internal combustion engines;

¹² Ibid, pp. 4.

¹³ IEA 2006. Their analysis is largely based on the data collected by the IEA statistical office from the governments of member countries on public spending in energy R&D. Considerations on quantitative trends are based on a smaller data set than the one actually available to the IEA because the government budget information is not available for all IEA countries for all years considered (1992- 2005). In order to have a consistent data set, data from the following countries was used: North America: United States and Canada; Europe: Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and Turkey; Pacific: Japan, Australia and New Zealand.

¹⁴ Cite to R&D paper, Section II.2.

¹⁵ Overview of Adaptation Investment Needs, Section __ above, at [subsection 3.1.2]

- Agriculture and forestry: remote sensing equipment; next generation biofuels;
- Buildings and waste: energy efficiency, methane capture and use for power generation.

For adaptation and as described in Section __ above, key sector/technology specific needs include:

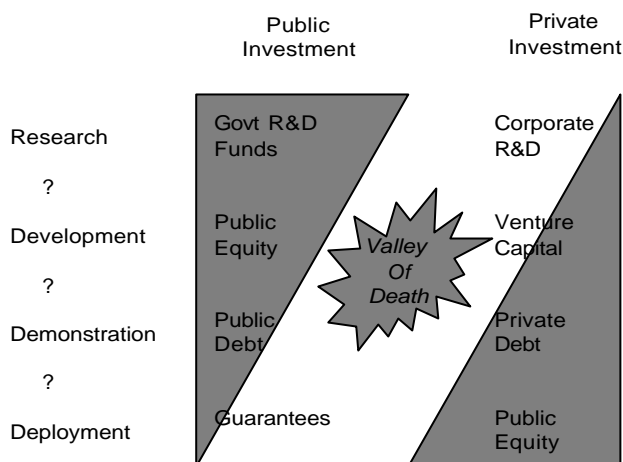
- Water supplies: water use efficiency and recycling technologies;
- Agriculture, forestry and fisheries: access to climate-adaptive crop/livestock varieties; low-water irrigation techniques; aquaculture technologies;
- Human health: monitoring and diagnosis technologies;
- Coastal zones: strengthening or relocation of coastal dikes and related structures.

In addition, there are a number of needs/issues that cut across sectors and are worthy of special attention, such as:

- Monitoring and information technology – needed in almost every sector;
- Technology transfer and deployment – a huge and continuing need in the developing world, both from traditional donors, as well as reflecting the increasing South-South transfers (such as China and infrastructure in Africa, Brazil and biofuels globally); and
- Intellectual property rights – how the IPR debate will be structured over the next ten years will profoundly influence the scale and nature of technology transfer.

As the risks facing any particular technology change as it moves through its lifecycle – from research to development, demonstration and deployment – so too do the sources of investment open to it. For example, as public investment is used to help reduce the risks of failure and increase the rewards from use for climate-friendly technologies, the returns shift from entirely social to both social and financial. As illustrated in Figure 8.5, this evolution in the risk profile encourages more private investment to come in to the technology:

Figure 8.5: Shift From Public To Private Funding Over The Technology Life-Cycle



Source: Gentry, B. 2007

However, the transition from public to private investment is not always a smooth one. As discussed in Section __ earlier, a major issue facing new technologies is to find sufficient funding to cross the “valley of death” between research and development to demonstration and deployment.

The big question facing the international community over investments in climate-related technology is where should governments focus their funds? What elements of a global R&D program for climate change are more globally public (such as adaptation, adoption, implementation (including enabling policy frameworks) and knowledge transfer) and which are more private (hardware)? Developing answers to this question will depend on the goals of the investor(s) involved, the benefits expected from the R&D effort, as well as the location of the technology on the path to commercialization. Some of the steps MDBs and other public investors are taking in this area are described below.

8.2.2.2 Sharing Project Risks Among Public and Private Partners

In addition to the risks facing any particular technology, other risks face efforts to install and operate any technologies in particular locations as part of any particular project. These project risks include many different aspects, two of which – sector and weather risks – will be covered in this section. The related set of risks that come with locating the project in a particular country are covered in the next section.

Sectors:

Different sectors present different risks at the project level. The power and water sectors, for example, pose network risks – particularly access and pricing. More decentralized

projects – such as energy efficiency or methane capture – face financing and capacity issues. Some examples of these different sectoral risks are provided below.

For the water sector, the major obstacles to private investment in water supplies include: the low rates of return; the capital-intense nature of the sector; the long payback periods; and the political sensitivity of the sector.¹⁶

Energy efficiency ventures and projects are harder to fit into the financing spectrum: there is usually no visible infrastructure (so no collateral) and no revenue stream.¹⁷ The concept of financing energy savings, guaranteed through performance contracts, needs to become more accepted in industrialized countries. In developing countries, energy efficiency presents a different opportunity. Fast-growing economies should be able to take advantage of the latest technology as they increase their generation capacity from the bottom up. It is easier (and cheaper) to build energy efficient generation than to retrofit existing plant, giving countries like China an advantage. In other developing countries, multilateral organizations can incorporate energy efficiency into many of their projects and encourage energy efficiency financing mechanisms to be developed. Additionally, most financing for industrial efficiency improvements comes internally from business.¹⁸ However, within industry, the majority of mitigation opportunities exist in developing countries, where the upfront financial investment, as well as knowledge about, and availability of advanced technologies are often lacking.

In the waste sector, most of the abatement opportunities in developing countries from methane capture still face many barriers to accessing investment.¹⁹ These include: lack of awareness of, and experience with alternative technologies; poor economics at smaller dumps and landfills; limited infrastructure for natural gas use in some regions; lack of even rudimentary disposal systems at many dumps; and difficulties bringing together the many different actors involved in energy generation, fertilizer supply, and waste management. To overcome these, a combination of several measures is necessary, including institution building and technical assistance policies, voluntary agreements, regulatory measures and market-based programs.

Finally, many risks face efforts to finance carbon capture and storage (CCS) projects.²⁰ One, before large-scale implementation of CCS can be done, technology development is still required, mainly in the capture part of the CCS chain. Though no real technical showstoppers have been identified, it is envisaged that at least two generations of pilot and demonstration plants are required. Two, only a few quantitative estimates on storage potentials have been made worldwide. These estimates should be treated with care as methodologies for capacity estimates are still in development and there is a substantial lack of reliable geological data, especially for aquifers and coal seams. Capacity is furthermore affected by the safety conditions which will be opposed to storage. As these

¹⁶ See Overview of Adaptation Investment Needs, Section ___ above, at [subsection 3.2.5].

¹⁷ See Overview of Mitigation Investment Needs, Section ___ above, at [subsection 2.1.5].

¹⁸ See Overview of Mitigation Investment Needs, Section ___ above, at [subsection 2.2.5].

¹⁹ See Overview of Mitigation Investment Needs, Section ___ above, at [subsection 2.4.5].

²⁰ See Overview of Mitigation Investment Needs, Section ___ above, at [subsection 2.1.5].

conditions are still under discussions, capacity estimates can not be made. Third, legal standards and public attitudes are important – and are not coming together very quickly, particularly for larger-scale demonstration facilities. Finally, the long-term liability issues of CCS also require resolution. The expectation is that the CO₂ will remain in the reservoir for thousands of years. The legal responsibility of entities operating CCS reservoirs must be clearly defined if they are to be able to attract the required investment.

Other sets of risks face investments in the other climate-relevant sectors. Some of these risks are best borne by the private investors involved (commercial risks). Some can be addressed by governments through the policy and investment frameworks they set. Still others can be taken by MDBs and other sources of public money designed to help spur additional private investment. Ultimately, some of these risks may well need to be taken by the government in the country where the project is located. Examples of some of these approaches to addressing sectoral risks are discussed in Section __ below.

Vulnerable locations:

As the impacts of climate change become more obvious, particularly through extreme weather events, more investors are starting to ask how vulnerable the locations of their investments are to climate change, as well as what they can do to share those climate risks. In general terms, the damage caused by climate-related events can be financed in various ways: from within the country affected or internationally. Funds can be provided through public finances, or the private sector, and within those through contractual arrangements like insurance, or informally through charitable relief. In the last resort, the damage may simply be taken as a loss in assets or income potential by the victims.

As discussed during a June 2007 consultation with the insurance industry, the increased risks due to climate change have led insurers to make major modifications in their risk profiling and coverage strategies. Catastrophic risk insurance has been treated as a yearly business, with premiums being reviewed every year based on the most recent experience with catastrophic events. Insurers have also withdrawn from high-risk zones or areas recently struck by catastrophic events. Increasing insurance costs and declining coverage have led to protests by consumers and political interventions on their behalf.

As a result, interest is increasing among governments and multilateral financial institutions in using a wider range of risk management instruments, particularly catastrophe bonds and weather derivatives, to help address the macro-economic financial impact of disasters.²¹ This is because it has become clear that ex-post financing is inefficient for several reasons (e.g. tardiness, impact on other projects, uncertainty), while insurance also has some deficiencies, principally lack of continuity in terms. A particular example of this new approach is the Caribbean Climate Risk Insurance Facility (see Box 8.1).²²

²¹ [cite to Extreme Events paper, section 3.4.d]

²² [cite to Extreme Events paper, section 3.4.d]

Box 8.1: Caribbean Catastrophe Risk Insurance Facility (CCRIF)

The CCRIF is being established under the coordination of the World Bank to provide Member States with index-based insurance (cat bonds) against government losses caused by natural disasters. It represents an important shift from disaster response to ex-ante disaster management and mitigation. Governments will purchase catastrophe coverage to provide them with a cash payment within one month after a major hurricane or earthquake. These funds are intended to meet a portion of the immediate liquidity problems that face governments in the aftermath of a disaster.

Pooling risk among 15 countries has enabled the premiums to be reduced by about 50% from the aggregate value of the individual premiums, due to the benefit of non-correlated risks, even within a fairly focused area like the Caribbean. The Facility will be created with the premiums from participating countries and substantial assistance from donors (47 million USD). For poorer countries, the fees will be subsidized or contributed by donors also. For tax efficiency, CCRIF will be domiciled in the Cayman Islands.

As exemplified by the CCRIF, a public-private partnership seems to be an appropriate model for insuring climate risk in developing countries – as public resources are limited and there are significant barriers to private investment. The most important attractions for the private sector are the prospect for a positive profit margin and scale. Image and corporate social responsibility alone do not justify sizeable commitments of resources. Figure 8.6 outlines the potential roles of the public and the private sectors in any such partnerships.

Figure 8.6 Public-Private Partnership Roles in Financing Adaptation to Extreme Events²³

Issue	Role of government	Role of private sector
Hazard reduction	Basic data and research Awareness-raising	Risk modeling
Resilience-enhancing measures	Regulation and enforcement	Incentives in product design
Product design	Public policy	Efficiency, marketability
Vulnerable sectors/communities	Infrastructure Pilot adaptation scheme funding Diminishing livelihood support	Micro-finance and –insurance backed by reinsurance Pooled development funds
Risk transfer	Guarantee fund Volatility smoothing	Insurance if conditions of insurability are met, otherwise services for public schemes
Disaster relief	Restricted, using hazard reduction and pre-funding	Relaxed terms of business during emergency Services for public schemes Claims under climatic impact insurance
Administration, including loss-handling	Minor	Major, using back-up from non-climatic business and overseas at peak-load times
Capacity building	Funding	Technical assistance
Technology for adaptation	Basic research	Finance and insurance for consumers and operators

²³ [cite to Extreme Events paper subsection 7.3]

	Incubator stage funding	Venture capital
Public goods - ecosystems, heritage	Conservation policy and funding	Technical advice, flagship funding
Economic stability	Security. Sound financial policy	Availability and accessibility
Financial markets	Policy and governance	Distribution and marketing “After- sale” customer service e.g. claims administration

8.2.3 Layering-In By Host Country Capacity

In addition to technology and project risks, country risks also play a major role in investment decisions. As shown in Figure 7._ different regions of the world vary dramatically in the types of investment capital they attract. For example, of the US\$56 billion that was invested in GFCF in Africa in 2000, 62% came from domestic investment, 4% from FDI, 4% from foreign debt and 30% from ODA. In the same year, the US\$712 billion of investment in GFCF in Developing Asia came 78% from domestic investment, 17% from FDI, 2% from foreign debt and 3% from ODA.²⁴

Many of these differences can be explained by the characteristics of the national investment markets involved. For example, UNCTAD has developed an “investment compass” to help countries understand how they rate on factors relevant to investment decisions by foreign direct investors.²⁵ The key variables include the following:

- Resource assets, including human and natural (raw materials, resources) capital, as well as market size;
- Infrastructure, including both basic (transport, water, power) and telecommunications;
- Operating costs, reflecting items such as wages, rents and electricity tariffs;
- Economic performance and governance, including factors such as economic growth rates, current account balance, unemployment, country debt rating, rule of law, and political stability;
- Taxation types and levels, along with investment incentives; and
- Regulatory framework for foreign investors, including entry, operating and exit requirements.

In the climate mitigation area, a similar analysis has been used by Ernst & Young to rank countries according how attractive they are to investors in renewable energy projects.²⁶ Again, the ranking criteria include measures of both natural and social capital, such as:

- The “Renewables Infrastructure Index”, covering items such as: electricity market regulatory risk; planning and grid connection issues; and access to finance; as well as

²⁴ Overview of Adaptation Investment Needs, Section __ above, at [subsection 3].

²⁵ http://compass.unctad.org/Page1_egml?country1=&country2=®ion=&sessioncontext=202061216&object=SC.app.objects.methodology (accessed July 19, 2007).

²⁶ [http://www.ey.com/Global/assets.nsf/International/Industry_Uilities_RenewableIndices-Q1-07/\\$file/Industry_Uilities_Attractiveness_Q12007.pdf](http://www.ey.com/Global/assets.nsf/International/Industry_Uilities_RenewableIndices-Q1-07/$file/Industry_Uilities_Attractiveness_Q12007.pdf)

- “Technology Factors”, including: power offtake attractiveness; tax climate; grant/soft loan availability; market growth potential; current installed base; resource quality; and project size.

Similarly, the relative difficulties countries face in mitigating or adapting to climate change are increasingly being recognized as dependent on their social, as well as biophysical characteristics. The mitigation or adaptive “capacity” of countries is now being measured by looking at factors such as: economic resources; technology; information and skills; infrastructure; institutions; and equity.²⁷ Such factors are increasingly being considered by private investors as they consider the locations for their projects, as well as by national governments as they review the increasing number of ways that their development and adaptation goals overlap (see discussion below).

The result is a spectrum across countries, from those able to attract substantial investment from the global capital markets to those more dependent on domestic capital and Official Development Assistance. Many more options exist for financing a large, efficient and clean power generating facility in a country that can tap a range of investment sources than in one that cannot. Similarly, these differences in institutional structures and basic infrastructure increase the difficulties of adapting to climate change in many of the world’s poorest countries.

Some of the implications of these differences across countries for layering-in public and private capital are illustrated in Figure 8.7 (taken from the water sector):

Table 8.7: Financing Options at Different Levels of Financial Sustainability

Creditworthy in Tested Country Conditions	Country Conditions and Developed Financial Markets	
Marginally Creditworthy	Reliable Refinancing Sources & Security for Loans	
Sustainable Cost Recovery	Anticipates Long-Term Cost Impacts (that is, FX, asset reevaluation)	
Cost Recovery	Profitable in Any Given Year, But Not Sustainable in Long Term	
Pay-As-You-Go Recovery of Cash	Capital Subsidies	
Unviable Loss-Making Utilities	Capital & Operational Subsidies	

Source: Baietti, A., World Bank, *Financing Water Supply and Sanitation Investments: Utilizing Risk Mitigation Instruments to Bridge the Financing Gap*, 2005, p 18.

²⁷ Overview of Mitigation Investment Needs, Section __ above, at [subsection 1.3.2]; Overview of Adaptation Investment Needs, Section __ above, at [subsection 1.2.1].

As with the technology life-cycle, this spectrum of capacity suggests different roles for public and private capital across different countries. For countries with broad access to the global capital markets (“Broad Access Countries”), the role for public capital in attracting or replacing private investment will be much reduced – to focusing on particular social returns in key priority areas. For countries with little or no access to private capital – either locally or globally (“Limited Access Countries”) – both domestic and international public capital will have a much wider role to play in substituting for or building the capacity to attract more private capital. Examples of these differences can be seen in the work of MDBs – providing partial risk guarantees to attract investors into certain countries, while financing capacity building and direct infrastructure in others.

8.2.4 How Might The COP Help Optimize The Application Of Currently Available Capital?

Optimizing the use of currently available capital by finding ways that different sources can lever off each other is a critical need in the climate arena. Fortunately, an increasing number of efforts are underway to spark conversations across different types of investors to find even more ways to form effective investment partnerships. For example, a quick review by the Secretariat identified more than 50 partnership/networking initiatives designed to bring more investment into climate-related sectors including energy, clean technology, forestry and responses to extreme weather events.

There are many ways the COP might help support these efforts to optimize the use of currently available investment capital.

One would be to support the efforts by the Secretariat, the MDBs, ODA agencies and others to engage with different types of investors to understand their needs and identify opportunities for partnering. For example, in consultations with the MDBs, private investors have indicated that mechanisms like the following are needed to leverage more private investment into clean energy projects in developing countries:²⁸

- Country-side risk mitigation products;
- Credit risk protection products;
- Political risk protection products;
- Concessional funding for key low-carbon technologies (particularly coal gasification and sequestration);
- Risk-mitigation products and financing for pre-commercial technologies;
- Stand-by protection for key risks; and
- Predictability in the post-2012 carbon markets for at least eight years.

Some of the financial innovations these and similar dialogues have led different MDBs to adopt are described in Box 8.2.

²⁸ Adapted from the Overview of MDB Clean Energy Investment Framework, presented in London, March 2007.

Box 8.2: Financial Instruments for Low-Carbon Development²⁹

International Financial Institutions can use a variety of instruments to facilitate the deployment of low carbon technologies through enhanced project and blended carbon finance. These can include the following:

- **Policy Loans** support a country's effort adjust its policy framework in a specific area – environment, transport – with a cross-cutting low-carbon component. Can be given to the Treasury (as the WB has done) or to a sector (as the IADB has done).
- **Sub-national Finance** allows IFIs to lend to sub-national government without sovereign guarantees, thus allowing cities or regional governments to deploy programs or projects which can reduce carbon impacts.
- **Partial or secondary guarantees** can help improve the credit rating of projects and loans involving local development and commercial financial institutions with renewable energy, energy efficiency and other carbon reduction projects;
- **Public-private sector loans/guarantees** granted directly through IFIs or other financial institutions, or indirectly through national development banks, to renewable energy, energy efficiency and other low carbon investments;
- **Participative loans** formed by a combination of grants, low fixed interest rates and variable market rates, based on a project's financial capacity to compensate the additional transaction and development costs of renewable energy and energy efficiency projects;
- **Guarantee Fund for CDM Projects.** These facilities seek to secure for local financial institutions part of the future cash flows generated by the carbon credits generated by CDM projects. These can also help extend carbon transactions beyond 2012, while increasing trust on the continuation of a similar regulatory regime;
- **Lending programs** deployed through local development and commercial banks, addressed to both public and private projects, in renewable energy, energy efficiency and other low carbon projects, with the inclusion of financial incentives depending on the profile of the client;
- Equity investments in Clean Energy
 - ✓ **Venture Capital Investment** oriented to capitalize and strengthen sustainable energy firms and, at the same time, promote low carbon projects in developing countries;
 - ✓ **Sustainable Infrastructure Development Investment** aimed at identifying and developing the promotion of small and medium-sized infrastructure projects such as mini hydro, biomass, biofuel, and solid waste management.
- **Special Purpose Entities (SPEs)** for pooled financing of small and medium low carbon projects. SPEs can operate together with local

²⁹ Adapted from Section ___ above on Technology R&D, [subsection III.5].

development and commercial banks, at a country level and serve as pooling agent for carbon credits generated by the eligible projects, reducing their transaction costs.
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One option is for the COP to consider how its activities and those under current and future versions of the Climate Change Convention might best add value to these dialogue and networking activities. This might include hosting new types of consultations (focused on the needs in particular locations (such as Africa) or sectors (such as energy efficiency)), participating more actively in the dialogues that are already underway, helping to disseminate the results of such exchanges and their implications for new ways to finance climate projects, as well as reflecting the results of these dialogues in the post-2012 framework.

Another option is to consider asking the GEF to focus the expenditure of the funds it manages under the Climate Convention on the following areas:

- Ensuring that its investments have a leveraging/multiplier effect on other sources of investment;
- Supporting capacity development for the management of strategic, climate-related sectors and sub-sectors; and
- Funding the creation of enabling environments for lower-carbon and more climate-proof investments by private and domestic public investors.

All of this, of course, would need to be done in a transparent, flexible and efficient manner without preventing the GEF from supporting Non-Annex I countries in meeting their obligations related to future national communications.

Finally, the COP might choose to evaluate regularly how different aspects of the activities under the Climate Convention best feed in to these efforts to optimize capital application through partnerships. For example, there is a pressing need to think through better ways for co-managing the multiple risks facing any particular carbon project. This may well be true in the case of the GEF and the CDM, which have largely operated separately from each other, even though they work in potentially complimentary areas: GEF grants could be used to lower the up-front costs and implementation risks facing selected projects, thereby helping to attract the finance necessary to develop and sell credits. Similarly, creatively packaging country risks (through partial risk guarantees from an MDB), while providing up-front grants or quasi-equity (such as from the GEF), commercially underwriting delivery risk through careful risk analysis/contractual drafting, and aligning carbon and non-carbon revenue streams (such as carbon credits and electricity from renewable energy facilities) may well create attractive packages for potential investors.³⁰

³⁰ Ian Johnson, personal communication, July 18, 2007.

8.3 Shifting-Over To Lower-Carbon, More Climate-Proof Investments

In addition to optimizing available public and private capital, it is also critical that more of the investments currently being made in climate-related sectors be shifted-over to lower-carbon, more climate-proof approaches. While increasing amounts of investment are already moving in this direction, reaching the scale of the investment needed will require a conscious effort by governments to reallocate the traditional types of investment being made in energy, transport, buildings and other infrastructure into more climate-friendly methods. This will require governments to decide to change both the policies they adopt and the uses they make of the capital they control. On the policy side, governments can adopt regulatory and other frameworks that tilt the playing field for private investors toward more sustainable climate options. On the public investment side, this means agreeing to allocate more capital to the public benefits provided by lower-emission, less vulnerable approaches. Some of the major options for doing so are discussed in this section.

8.3.1 Using Investment Frameworks/Policies To Drive Private Investment

Private investors – whether they are domestic or international – follow the opportunities to make a risk-adjusted return that meets their investment appetite. Given the increasing amounts of public and government attention to climate change over the past few years, it is no surprise that there has been an increase in private investment in the area – the opportunities to make a profit are clearer and more immediate. More attention is also being paid to the risks of climate change – the need to consider the impacts of higher sea levels or more extreme weather events on the projected returns from investments particular locations. While these shifts in private investment are most welcome, they appear unlikely to be sufficient to offset the much larger, continuing investments in more traditional long-lived, fossil fuel consuming, GHG emitting facilities.

Governments – primarily national – set the rules for the markets in which investors seek profits. If current market rules are failing to attract – or drive – private investors into lower-carbon, more climate-proof alternatives, there are a variety of steps governments can take to help address these market failures, including the following:

- ***Filling information gaps*** by: (1) requiring disclosure of data on emissions from production operations or the energy use by products; (2) supporting voluntary efforts to make such data available (such as through certification programs); and (3) directly providing data helpful to potential investors (such as on wind resources or investment incentives).
- ***Overcoming policy-based barriers to entry*** by: (1) requiring regulated, monopoly network providers (such as electricity grids) to provide access to and purchase services from lower carbon providers on financially attractive terms (such as the feed-in tariff in Germany); (2) reducing or removing perverse subsidies supporting dirtier, less efficient energy production and/or use (such as subsidies for fossil fuel production); and (3) reducing or removing perverse standards impairing the ability to

implement lower carbon solutions (such as the building codes and energy efficiency or zoning codes and higher density, mixed use developments).

- ***Making the polluter pay*** (*internalizing externalized costs*) by: (1) imposing greenhouse gas emission limits or performance standards on production operations and products (such as vehicle emission standards); (2) imposing taxes or other charges on greenhouse emissions or fossil fuel use (such as a tax on coal use); and (3) holding polluters liable for the climate damage they cause.
- ***Paying the innovator*** (*internalizing externalized benefits*) by: (1) creating tradable rights to reward investments in reducing GHG emissions (such as under a cap and trade regime); (2) offering fiscal incentives for investing in lower carbon methods (such as production tax credits for renewable energy); and (3) providing direct public support for lower carbon activities (such as funding for research and development).

Such policy mechanisms can and are being adopted by governments around the world – at the international (Kyoto Protocol – cap and trade carbon markets), regional (EU support for renewable energy), national (China’s renewable energy goal), state (state and regional GHG cap and trade programs in the US) and local (municipal procurement requirements for cleaner buses) levels. Examples of developing countries applying these approaches in the renewable energy sector are provided in Appendix 8.B. These policy tools can also be used across many different sectors – as shown in Appendix 8C.

By using these policy tools to “tilt the playing field” toward lower-carbon, more climate-proof investments, governments can enable even more private investors to shift their investments over to attractive opportunities in more climate-friendly approaches.

8.3.2 Attracting More Public Investment To More Climate-Sensitive Options

In addition to enabling more private investors to find a profit in shifting to more sustainable approaches, governments also need to consider shifting the focus of their own investment. Private investors are not going to meet every investment need – particularly those offering large social returns, but little or no financial reward. In the climate arena, these needs are most acute in the locations and sectors that are not open or attractive to private investors. Some options for shifting-over public investments are offered below for consideration by both national governments and international public investors.

8.3.2.1 Domestic/National Governments

As shown in Table 7.__, over 11% of global investment in GFCF came from domestic governments in 2000. This investment is not driven by climate change.³¹ Rather, it is aimed at addressing the government’s key, local development priorities, whether they are jobs, power, transport, education, health or other public benefits. As the government invests in fixed capital assets, it locks in an emissions/energy usage path for the life of those assets. Given that dirtier, less efficient technologies are often the cheapest to build, they are often seen as the best way to achieve these other social goals.

³¹ Overview of Adaptation Investment Needs, Section __ above, at [subsection 1.2.2].

Many countries, however, are beginning to consider shifting-over to more climate-friendly approaches in to their domestic investment programs. Why waste energy if your country's national debt increases and energy security decreases as the price of energy imports climbs? Why build new facilities in the paths of typhoons or severe flooding? Is it possible to alleviate poverty without taking climate change into account?

Answers to these and related questions suggest that there are increasing opportunities to mainstream climate considerations into traditional government investment calculations. Most mitigation investments in response to climate change will likely have benefits beyond climate change. Energy efficiency investments reduce energy expenditures which impact both firms and households. Given rising concern over conventional air pollution including SO₂, NO_x, mercury and particulates from coal power plants in particular, it will be essential to incorporate these co-benefits into any CO₂ emission reduction plan. Moreover, the use of renewable and other non-fossil fuel energy resources – arrayed in a decentralized production scheme can also have both adaptation and mitigation benefits.³² Smaller production facilities enabled by new materials and technologies with negligible economies of scale may also create a more robust adaptation response.

As such, one of the biggest needs facing efforts to address climate change is to find workable ways to shift more of this domestic public investment over to lower-carbon, more climate-proof approaches. Among the options being discussed are the following:

- Shifting existing public subsidies away from fossil fuels and toward both cleaner/more efficient energy use, plus transitional income support for affected individuals (energy subsidies amount to \$150 to \$250 billion/year³³);
- Shifting other subsidies away from unsustainable land uses, such as the US\$325 billion per year going to the agriculture sector, US\$60 billion to water users, US\$35 billion to forestry, US\$25 billion to mining, and US\$20 billion to fisheries³⁴;
- Integrating savings from investments in energy efficiency into the initial investment calculations for new buildings and facilities;
- Using any local political support for efforts to reduce the local health/ environmental impacts of dirty/inefficient fossil fuel use to help authorize more domestic spending on cleaner energy projects.

8.3.2.2 International Public Investors

In addition to domestic public investors, international public investors are also considering shifting-over more of their traditional investment to more sustainable climate approaches. Many of the MDBs have responded by increasing their attention to climate-

³² Overview of Mitigation Investment Needs, Section ___ above, at [subsection 1.3.3].

³³ [cite to earlier section on subsidies]

³⁴ Overview of Adaptation Investment Needs, Section ___ above, at [subsection 3.4.1].

related projects and activities. Examples of some of their recent initiatives include the following³⁵:

- AfDB: mainstreaming energy access for development and adaptation in Africa;
- ADB: supporting the development of sustainable transport systems in Asia;
- IDB: assessing and helping to overcome the barriers to increasing the use of clean energy in Latin America and the Caribbean;
- EBRD: scaling up the implementation of sustainable energy solutions (energy efficiency and clean energy) in the economies in transition;
- EIB: support research, development and demonstration in renewable energy; and
- World Bank: mainstreaming efforts to increase energy access in Sub-Saharan Africa, transition to a low carbon economy and adapt to climate change.

In addition, a number of MDBs have come together to work on a “Clean Energy Investment Framework.” This effort involves conversations among the MDBs, as well as with the private financial community, to identify ways that the MDBs can help increase overall investment in a lower-carbon future. Some of these involve the possibility of assembling new funds and are discussed in Section 8.4.2 below. Others consider using existing funds to explore new ways to support investments in specific pre-commercial technologies (for example, coal gasification and carbon sequestration). For example, concessional loans might be used to help buy-down the incremental costs of such high-impact technologies (Figure 8.8 includes indicative data on incremental cost estimates).

Figure 8.8: Indicative net size of buy down required for cleaner technology coal plants (IGCC) in China³⁷

Upgrade in technology	Incremental investment cost	Indicative incremental cost impact for a 400 MW plant
	\$/kW	\$
Low efficiency sub-critical to IGCC	+374	+150m
Super critical to IGCC	+312	+125m
Low efficiency sub-critical to IGCC + CCS	+1024	+410m
Supercritical to IGCC + CCS	+962	+385m

Source: Based on Clean Energy and Development-Towards an Investment Framework, Annex J, The World Bank, 2006

Some of the options being considered for providing project specific support to clean energy investments in developing countries are described in Box 8.3.

³⁵ World Bank Presentation on “Overview of the MDB Clean Energy Investment Framework: Working in Partnership”, London, UK, March 2007.

³⁶ [insert citation to most recent document publicly available]

³⁷ [add appropriate cite to CEIF materials, this from June 2007 paper, p 7.]

Box 8.3 Possible Clean Energy Project Support Mechanisms

Suggested interventions	Type of support a facility could offer
Buy down <i>incremental</i> costs of pre-commercial high-impact technology	Provide concessional loans to help with high capital costs of initial generation plants. Loans will consist of a blend of loan financing and grant. The grant pool may be replenished with proceeds from the sale of carbon credits.
Increase certainty of carbon credit cash flows	Scale up the volume of purchases of project-based carbon credits after 2012. Increase the credit worthiness of future carbon credits cash flows.
Wider supports - increase tariffs to better recover costs (cash flows from energy sales)	Provide certainty that tariffs can be set at a level to recover costs. Use of partial risk guarantees (PRGs) and other similar instruments to backstop the policy.

As part of this process, questions have also been raised about whether the MDBs should reduce or make more expensive their support for dirtier, less-efficient or less climate-proof projects. Similar questions are being raised about the support for exports provided by ECAs.

8.3.3 How Might The COP Help Shift-Over More Private And Public Investment?

The COP has a number of different options to consider on how it might help shift more of the current investment over to more sustainable climate approaches.

On the use of policy tools and enabling frameworks to help shift more private investment, the COP might consider the following:

- Adopting other policy tools at the international level in a post-2012 agreement, such as those on information disclosure or taxation (see discussion in Section 8._ below), in addition to expanding the carbon markets (see discussion in Section 8._ below);
- Promoting the provision of more financial support to national governments considering the adoption of such policy tools;
- Supporting efforts to collect and disseminate the experience of other governments, particularly those in developing countries, to use these and other policy tools to increase private investment in climate-friendly approaches;
- Participating in continuing dialogues with a wide variety of investors on how such policy approaches affect their investment and how they might be changed to increase their investment still further.

Some of the options the COP might consider in helping to mainstream climate considerations in domestic public investment include the following:

³⁸ See Section _ below.

- Publicizing data and examples of the co-benefits of investments in lower-carbon, more climate-proof future;
- Promoting the sharing of experiences across countries, particularly South-South, on the benefits and risks associated with shifting-over more national investment into lower-carbon, more climate-proof approaches;
- Collecting and disseminating examples of the steps individual countries have taken to shift-over their public investment.

Finally, the COP might also consider the following options for helping to shift-over more international public investment:

- Working with developing country parties to help target the new types of support being offered by the MDBs, particularly for investments by domestic governments;
- Advocating that the MDBs and ECAs factor the costs of carbon/climate change into all of their lending/support programs so as to provide internal incentives in favor of cleaner/more climate-proof projects;
- Reviewing the opportunities and ensuring that the funds currently available under the Climate Convention are available and being used (to the fullest extent possible) to help investors shift-over from their traditional investment patterns.

8.4 Scaling-Up Climate-Focused International Capital

Even if available capital were optimized across sources and that being invested in particular sectors shifted-over to more climate-friendly approaches, there is still a need to scale-up the international pools of capital dedicated to addressing climate change. For example, the biggest sectoral challenge facing many clean energy technologies now lies in reducing their costs compared with fossil-fuel derived solutions. The World Bank has estimated that US\$30 to 40 billion are required annually to cover the incremental additional investment costs of clean energy technologies.³⁹ The added costs of adapting investments to the risks of climate change are estimated to be approximately US\$40 billion per year, with a range of US\$ 10 to 100 billion.⁴⁰ Many of the countries facing the greatest damage from climate change have the lowest mitigation and adaptation capacities.

Dedicating more international capital to climate change means more opportunities to lever other sources of finance (as discussed in Section 8.1 above). On the private investment side, this means expanding the carbon markets, particularly in the developing world. On the public investment side, this means expanding the climate-focused funding from donor countries, as well as the funding available under the Climate Convention and the Kyoto Protocol. Each of these areas is discussed below.

³⁹ [Cite to appropriate CEIF document – this one from page 2 of June 20, 2007 draft]

⁴⁰ Overview of Adaptation Investment Needs, Section 3.7 above, at [subsection 3.7.3].

8.4.1 Expanded Carbon Markets

As discussed in Section __ above, the international carbon markets are growing rapidly. Included are the markets for both greenhouse gas emission reductions (credits) and government-issued rights to release greenhouse gas emissions (allowances). Each greenhouse gas emissions trading system creates its own market. Although there are a number of different markets, they can be, and to a limited extent are, linked. The largest markets are established by the Kyoto Protocol and Parties that have emissions limitation commitments under the Protocol. The current and projected size of the largest carbon markets are summarized in the Figure 8.9:

Figure 8.9: Current And Projected Scale Of The Largest Carbon Markets⁴¹

Year	Market	Sales (2006 US\$ billion)	Quantity (MtCO ₂ e)	Price (2006 US\$/tCO ₂ e)
2006	Clean Development Mechanism (CDM)	\$5	475	\$10.70/\$17.75
	Joint Implementation (JI)	<\$1	16	\$8.80
	EU emissions trading scheme (EU ETS)	\$24	1,101	\$22.15 (\$5-\$40)
2010	Compliance by Annex I/B Parties to the Kyoto Protocol (mainly CDM and JI)	\$10 to \$15 (\$5 to \$25)	400 to 600 ex Canadian government	\$23.60 (\$13.50 to \$33.75)
2030	Purchases by current Annex I Parties to the Convention from developing countries			
	Low estimate	\$10 to \$15 (\$5 to \$25)	400 to 600	\$23.60 (\$13.50 to \$33.75)
	High estimate	\$100 (\$90 to \$125)	4,000 to 6,000	\$23.60 (\$13.50 to \$33.75)

The estimated revenue from the sale of the certified emission reductions (CERs) generated by the CDM projects that entered the pipeline during 2006 is 2006 US\$1.5 to \$2.5 billion per year. The capital that is or will be invested in those projects is estimated at over 2006 US\$25 billion. Of that amount approximately 50% represents capital invested in unilateral projects by host country project proponents. Renewable energy and energy efficiency projects accounted for \$24 billion of the overall investment. This compares with ODA of 2005 US\$2 billion and private investment of 2005 US\$4.5 billion in similar projects in all developing countries during 2005. In addition, the number of carbon funds dedicated to investing in reducing emissions of greenhouse gasses has grown rapidly from just three with a capital base of €351 million in 2000 to 54 with capital of over €6,250 million early in 2007.⁴²

While the carbon markets are growing rapidly, they are not – standing alone – going to generate all the investment needed to put the world on a sustainable climate path. By definition, they are only focused on projects that reduce emissions – so they will not help

⁴¹ Carbon Markets paper, Executive Summary.

⁴² See Section _ on the carbon markets, subsection [2.10].

fund adaptation projects as currently structured. In order to ensure quality, stringent, mostly project based rules are in place in compliance markets for deciding which credits qualify. While certainly appropriate, the result is often long and expensive approval processes – which can discourage private investors. In addition, many renewable energy and energy efficiency projects do not qualify for the “multipliers” that benefit projects reducing emissions of more potent greenhouse gasses (such as methane capture or CFC destruction projects). Finally, since they rely primarily on private investment, relatively few projects are undertaken in parts of the world that are less attractive to private investors (such as parts of Sub-Saharan Africa).

At the same time, the carbon markets are the most important mechanism for attracting more private investment into developing innovative solutions for reducing GHG emissions. As such, many are pushing for their expansion post-2012. Consultation with private sector investors in London on June 21, 2007, revealed that the expansion of global carbon markets is constrained primarily by the absence of long term political certainty over the existence and stringency of the GHG reduction targets to be met in different parts of the world.

Among the options that the COP might consider for expanding the carbon markets under the Convention are the following:

- Securing a strong demand for credits by adopting stringent targets and securing the participation of US and Canada in the post-2012 markets;
- Taking a long-term perspective (i.e. adopting policies with 20-30 year time horizons), particularly to stimulate investments with significant sustainable development benefits;
- Strengthening existing market governance institutions by making them more independent of political processes and more attuned to the opportunities and constraints of private carbon market actors;
- Addressing issues of technology and country risks by supporting the development of risk guarantees and other risk sharing mechanisms;
- Reducing the transaction costs associated with project-by-project approvals, such as by promoting further programmatic CDM credits⁴³;
- Expanding the opportunities to supply credits by increasing the range of activities that are recognized in the carbon markets, particularly in the forestry sector;
- Offering both incentives for investments in CDM projects in Sub-Saharan Africa and other regions that are not receiving many investments under the current program and support for capacity building to put enabling environments in place;
- Supporting efforts to make the carbon markets more accessible to small, domestic providers through special rules and financial support mechanisms.

⁴³ [insert definition]

8.4.2 Expanded Climate Funds From Donor Countries

In addition to expanding investments from private and public sources in the carbon markets, Annex I countries should meet their commitment to make “new and additional” resources available to non-Annex I countries under Article 4.3 of the Climate Convention. As discussed in Sections 8.2 and 8.3 above, if more such funds were available, they would be extremely valuable for both leveraging investment from sources, as well as for helping countries with the lowest mitigation and adaptation capacities improve their ability to respond.

Among the leading initiatives in this regard is the work by several MDBs on the “Clean Energy Investment Framework” (CEIF) called for during the 2005 G8 Summit in Gleneagles. In addition to the initiatives mentioned in Section 8.2 above, the banks involved are considering asking donor countries to establish several new funds dedicated to addressing climate change, including the following:⁴⁴

The Carbon Facility for Low-Carbon Growth: The Facility would support long-term low carbon investments that decrease the carbon intensities of growth. It would use the carbon markets to promote GHG mitigation. The Facility would purchase emission reductions beyond the 2012, and in doing this, it would also provide continuity and sustain capacity in the carbon market both in developed and developing countries. This will enhance the value of carbon finance to leverage investment for clean energy and use of lower carbon technologies.

The Concessional Financing Vehicle: The banks involved in the CEIF discussions have identified the need for expanded project specific support in buying down the substantial up-front additional costs of pre-commercial technologies that have the potential to substantially reduce future growth in emissions. In particular, IGCC and IGCC with carbon capture and storage technologies were identified for buy down support as they represent substantial incremental costs over sub-critical and super-critical coal combustion technologies. CFV will be a dedicated grant financing facility to provide implementing agencies (public and private) with tailored project specific supports to buy down the incremental costs of clean energy technology and related infrastructure. The facility will be funded via a combination of cash and pledges from donor countries.

The Clean Energy Support Fund: This fund would be a financing vehicle (probably a global trust fund) that would provide counter indemnities to international financial institutions so that they can provide more partial risk guarantees and partial credit guarantees to clean energy projects expediently and in compliance with their internal accounting and financial safeguards. The guarantees would be issued to protect debt service payments to private banks and bondholders based on future flows of carbon credits. It is anticipated that the Fund’s main equity component would be pledges from donor countries (G8 +) callable on demand (mostly AAA rated commitments). The Fund is intended to be large enough to allow it to be an effective support for the mobilization of private capital to clean energy investments.

⁴⁴ [cite to appropriate CEIF paper, this from June 2007 draft, pp 9, 10, 14 and 18]

The Forest Carbon Partnership Facility: It is proposed that the Facility should comprise two mechanisms with different objectives. The first, or “readiness mechanism”, would focus on building capacity in about 20 developing countries, preparing them for an eventual, larger system of incentives. The second, “carbon finance” mechanism, would test different performance-based financial incentives for reduced emissions from deforestation in a small subset of these countries. The Facility would seek to reduce deforestation rates in areas where the level of carbon payments can compensate for the foregone economic profits, but would also engage in long-term and comprehensive policy changes in the forestry sector in partnership with the relevant actors in the countries. It would be closely integrated with the World Bank’s proposed Global Forest Alliance, so as to bring together various international partners and stakeholders in the forest sector under an overarching strategic partnership designed to increase the effectiveness of policies and programs in the forest sector.

In considering its options for helping to raise these and other “new and additional” sources of funding from donor countries, the COP will need to bear in mind the donors’ parallel commitment to increase ODA to 0.7% of national GDP.⁴⁵

8.4.3 Expanded Sources Of Funding Under The Climate Convention

Finally, in addition to scaling-up investment in the carbon markets and donor resources, the COP might also consider some more direct options for scaling up the funding available under or associated with the Climate Convention. Many different possibilities are being suggested by different parties. Brief descriptions of some of the major options are provided in this section:

*Auction of allowances for international aviation and marine emissions:*⁴⁸ Emissions associated with international air and marine transport are growing rapidly and are not currently regulated. An allocation of assigned amount units (AAUs) or equivalent allowances could be established for international air and marine transport by the COP in conjunction with relevant agencies, such as the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO). The allowances could be sold by auction.

Emissions from international aviation are projected to grow at a rate of 4.5% per year through 2030, while those for international marine transport are projected to grow at a rate of 2.4% per year. A requirement to hold allowances for the emissions would promote

⁴⁵ For a recent review of this commitment, see UNDESA, [World Economic and Social Survey 2005: Financing for Development](#).

⁴⁶ [insert definition]

⁴⁷ Müller, Benito and Cameron Hepburn, 2006. *IATAL — an outline proposal for an International Air Travel Adaptation Levy*, EV 36, Oxford Institute for Energy Studies, Oxford, October.

⁴⁸ [cite to Carbon Markets paper, subsection 5.]

the adoption of emission reduction measures which have been projected to reduce aviation emissions by about 15% and marine emissions by about 20% by 2030.⁴⁹

The issue then is the allocation for each sector. If the allocation is less than the emissions after implementation of the reduction measures, they will purchase CERs, ERUs or other units to cover the balance of their emissions. If the allocation is equal to the emissions after implementation of the reduction measures, the Conference of the Parties can decide how to use the revenue from the auctioned allowances. Auctioning allowances to cover international aviation and marine emissions could generate revenue of 2006 US\$20 billion in 2010 rising to \$35 billion in 2030.

Table 8.10: Estimate of Potential Revenue from an Auction of Allowances for International Aviation and Marine Bunkers

	2010	2020	2030
BAU International aviation emissions (Mt CO ₂)	450	725	1,100
Potential emission reductions		75	150
Total	450	650	950
BAU International marine emissions (MtCO ₂)	500	625	800
Potential emission reductions		75	150
Total	500	550	650
Price (2006 US\$/tCO ₂ e)	\$23.60	\$23.60	\$23.60
Aviation revenue (2006 US\$ billion)	\$10	\$15	\$22
Marine revenue (2006 US\$ billion)	\$12	\$13	\$15
Total revenue from international bunkers	\$22	\$28	\$37
Source: Emissions data from den Elzen, Olivier and Berk, 2007, Chapter 2 and Kahn Ribeiro and Kobayashi, 2007.			

International Air Travel Levy: In addition to auctioning allowances, others have suggested that emissions from international air transport be addressed through an International Air Travel Adaptation Levy (IATAL).⁵⁰ The IATAL is a charge based on the per capita flight emissions and is levied on the ticket price. An IATAL would reduce emissions where demand is price elastic and raise revenue where demand is not elastic. Müller and Hepburn estimate that a low levy (French HIV charges or 5% on first and business class tickets) to raise revenue would yield €3 to €6 billion annually. They suggest that the IATAL levy reflect a combination of a revenue raising and emission reducing objectives and average €5 (2005US\$6.5) per passenger per flight to generate €10 billion (2005US\$13 billion) annually.

An International Carbon Tax: An international carbon tax on internationally traded fossil fuels could also raise revenues to assist with mitigation of and adaptation to climate change. The tax could be collected on a limited number of long-distance energy transport

⁴⁹ Kahn Ribeiro, S. and S. Kobayashi, 2007. "Transportation and its infrastructure," Chapter 5, Metz, B., et al. (Eds.), *Climate Change 2007: Mitigation*, IPCC Working Group III, Cambridge University Press, Cambridge.

⁵⁰ Müller, Benito and Cameron Hepburn, 2006. *IATAL — an outline proposal for an International Air Travel Adaptation Levy*, EV 36, Oxford Institute for Energy Studies, Oxford, October.

systems (tankers, pipelines, and electrical grids) based on the relative GHG impacts of the energy transported. This would effectively exempt a large number of local energy purchases and the related collection issues. It would also allow for an audit trail as the originating flow through the international energy transport system could be reconciled with the withdrawal records at the destination sites.

National collection of a fixed rate per source of GHG could be determined by an international process. Reporting of collections to an international body would permit the coordinated collection effort with the destination sites. Were exporters not providing adequate tax collection data, national authorities at the distribution point could collect the GHG-sensitive tax.

The resources collected from this internationally coordinated carbon tax could be used for several different purposes. One would be to finance emergency climate mitigation and relief efforts. Another would be to offer transitional support for diversification from existing oil based economies. Funds could also be used to support the risk sharing and capacity building activities discussed earlier in this paper. Finally, scientific studies of climate change could also be supported. Most carbon tax proposals have as their principal goal using the price system to effect a change in the consumption of fuels that contribute most to GHG emissions. A different approach would be to set the tax rate based on the estimated revenue needs for the specified objectives.

A Tax On International Currency Transactions: In the late 1970's, Yale economist James Tobin proposed a currency transaction tax as a way to enhance the efficacy of national macroeconomic policy and reduce short-term speculative currency flows. Due to the large volume of international currency transactions, even a low tax would generate a considerable amount of revenue that could – in theory – be applied to a variety of public goods, including investments responding to climate change.

There are numerous estimates of the revenue that a currency transaction tax could generate. They vary widely due to differences in the assumed tax rate, implementation of the tax and the estimated change in trade volumes due to introduction of the tax. For example, Niskanen assumes that the tax rate would need to be low for both political (to get universal adoption) and technical (to minimize market disruption and tax evasion) reasons. She estimates that a tax of 0.01% applied to wholesale transactions would generate revenue of 2003 US\$ 17-19 billion per year, while a tax of 0.02% would generate annual revenue of 2003 US\$ 30-35 billion.

Although a currency transaction tax is widely accepted as being technically feasible, how it could best be implemented and enforced is still much debated. However, the biggest barrier to implementation of a currency transaction tax is the global political consensus needed for universal adoption.

IMF Special Drawing Rights: In the run-up to the 2002 UN Conference on Financing for Development, George Soros of Soros Fund Management and Joseph Stiglitz of Columbia University proposed that the International Monetary Fund (IMF) authorize a new form of

Special Drawing Rights (SDR) to meet a share of the estimated \$50 billion needed to help developing countries meet the Millennium Development Goals (MDGs).⁵¹ SDRs are a form of intergovernmental currency use by the IMF to serve as a supplemental form of liquidity for its member countries.

Under Mr. Soros' proposal, the IMF would allocate new SDRs to all member countries. Under the assumption that developed countries do not need the additional liquidity, they would be expected to make their new SDRs available to approved international NGOs to distribute to meet specific Millennium Development Goals. For the first time, these pre-approved international NGOs would be permitted to hold SDRs that they could convert to hard currencies. They would be responsible for distributing the hard currencies to other NGOs to implement MDG projects at the local and national levels. The proposal received great attention during the 2002 International Conference on Financing for Development, prompting a number of OECD countries to commission studies and policy papers on the idea.

As the impacts of climate change are of a global character, with substantial and growing impacts on development and poverty alleviation, a modification of the proposals from Soros and Stiglitz might be considered to incorporate climate mitigation and adaptation activities. The IMF board could propose to member states that issuance of SDRs to recognized NGOs, particularly in concert with a post-2012 framework, would be in line with the requirements for enhancing stability in the global financial markets.

Funds to Invest Foreign Exchange Reserves: Currently, most foreign exchange reserves are invested in government treasury bills with low yields and significant exchange risks. The ADB estimates that in local (appreciating) currency terms, the returns from these reserves are close to zero. According to its analysis, "given the large reserves-to-GDP ratio of many Asian countries, the current investment strategies could be costing the countries between 1.5%–2% of GDP each year."⁵²

Given these low returns and not insignificant risks, countries with large reserves-to-GDP ratios might consider transferring a small part of their foreign exchange reserves into funds, similar to carbon funds, which would then invest in energy efficiency, renewable energy, and other emission mitigation companies or projects. As in the case of carbon funds, such a fund could invest reserves contributed by a single country or by several countries. The investor(s) would establish the policies of the fund; such as eligible investments and target returns on investment.

With an appropriate mix of investments it should be possible to maintain the value of the reserves contributed and earn a small return. A fund would provide some diversification in the foreign exchange reserve investments, but would be less liquid than treasury bills.

⁵¹ George Soros, "Soros on Globalization", Appendix ('Special Drawing Rights Proposal'), New York & London, Public Affairs, 2002.

⁵² Asian Development Bank (ADB), 2007. *Toward a New Asian Development Bank in a New Asia: Report of the Eminent Persons Group to The President of the Asian Development Bank*, Asian Development Bank, Manila, March. p. 25.

Liquidity is important for foreign exchange reserves, so only a small part of the total, 5% or less, could prudently be contributed to such funds. By way of rough example, contributing 5% of the US\$ 708 billion in reserves held by ADB client countries would provide US\$ 35 billion of investment capital.

Other suggestions for scaling-up the international pools of capital dedicated to addressing climate change include... As the impacts of climate change become clearer and the political momentum to act spreads to new actors, one can confidently say many more suggestions for creative ways to raise new money will continue to arise.

8.5 Areas for Further Work by the Secretariat and the COP

As described throughout this Section, the COP has many options it might consider for optimizing, shifting-over and scaling-up investments for responding to climate change. Among the broad areas for further work are the following:

- ✓ Enhancing the delivery of climate benefits by optimizing existing investment and finance schemes, as the carbon markets continue to grow and efforts to build effective investment partnerships expand;
- ✓ Increasing the opportunities for private sector investment in support of the goals of the Convention, particularly in rapidly developing, middle-income countries;
- ✓ Developing new and additional options for increasing the pools of international investment capital dedicated to responding to climate change; and
- ✓ Facilitating the provision of guidance from the Parties as to the manner in which the work to date on investment and financial flows should inform the negotiations on a post-2012 framework

At a more tactical level, and as the first ever effort to collect and present data on projected, climate-related investments under reference and mitigation scenarios, it is not surprising that this study encountered many gaps in the existing data. The questions of whether and how to fill any of these gaps should be considered by the Parties at their next meeting.

In addition, the results of this analysis present an accurate picture of the complexity of the systems involved – across investors, sectors, technologies, locations and other factors. This is to be welcomed, as a more nuanced view of the opportunities and barriers facing investments in a more sustainable climate future is important to making progress.

At the same time, the Parties cannot be expected to engage in the same level of detailed investment analysis when negotiating the post-2012 climate framework as the World Bank, a host country government and a series of private investors will when considering any particular investment project. An increasingly large array of public and private experts are focusing in on how best to apply particular sources of funding, adopt particular policies or choose particular technologies for projects in particular locations.

While it is important for the Parties to be aware of and consider the implications of these complexities in their deliberations, it is even more critical that some widely supported, relatively simple and actionable themes be developed around which the structure of the post-2012 framework can be shaped. Doing so will give the investment community both the rules it needs to predict risks and returns, as well as the room it needs to innovate for realizing both financial and social returns.

One option is to focus on the areas where: (a) the investment markets are “failing” to deliver sufficient public and private investment; and (b) the global structure of the COP and the Convention provides a comparative advantage. Such an approach might suggest the following key themes for work by the Parties and the Secretariat:

- Expanding the carbon markets through stringent caps and clear, long-term rules;
- Adding new and additional financial resources from Annex I countries for helping developing countries adapt to and mitigate climate change;
- Encouraging and working with the MDBs, ECAs and other IFIs on their efforts to shift-over and layer-in their funds to lever more private – and domestic public – investment in a more sustainable climate future;
- Helping to shift-over more domestic investment in developing countries to a lower-carbon, more climate-proof future through the inclusion of meaningful commitments to reducing emissions in the post 2012 regime; and
- Supporting and participating in the efforts of networks such as the Renewable Energy and Energy Efficiency Partnership to bring government officials, investors and NGO representatives together to find new financing and policy approaches to bringing more investment to addressing climate issues.

Appendix 8.A: Renewable Energy Policies and Government Support in Developing Countries

Source: *New Energy Capital paper on Investment in Renewable Energy and Energy Efficiency*, section 5.1.5

Country	Policy Name	Policy Type	Technology	Renewable Energy Target
Brazil	The PROINFA Programme	<ul style="list-style-type: none"> ○ Guaranteed Prices / Feed-In ○ Obligations ○ Tradeable Certificates ○ 3rd Party Finance 	<ul style="list-style-type: none"> ○ Onshore Wind ○ Bioenergy ○ Hydropower 	Additional 3300 MW from wind, small hydro, biomass by 2016; 15% of primary energy supply by 2020
	National Programme for Energy Development of States and Municipalities (PRODEEM)	<ul style="list-style-type: none"> ○ Rural electrification 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	
	National Rural Electrification Programme	<ul style="list-style-type: none"> ○ Rural electrification 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	
China	Brightness Programme	<ul style="list-style-type: none"> ○ Capital Grants 	<ul style="list-style-type: none"> ○ On-shore wind ○ Solar Photovoltaics 	
	The People's Republic of China Renewable Energy Law	<ul style="list-style-type: none"> ○ General Energy Policy ○ Guaranteed Prices / Feed-In ○ Obligations ○ RD&D ○ Regulatory and Administrative Rules 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	3.3GW by 2006 from wind, biomass and mini-hydro. To reach 120GW of RE by 2020. 10% of energy from RE by 2010, 16% by 2020. - Wind: 30GW by 2030 - Solar PV: 300MW by 2010, 1.8GW by 2030
	Reduced VAT and Income Tax	<ul style="list-style-type: none"> ○ Excise Tax Exemptions ○ Sales Tax Rebates ○ Tax Credits 	<ul style="list-style-type: none"> ○ Onshore Wind 	
	Wind Power Concessions Programme	<ul style="list-style-type: none"> ○ Bidding Systems ○ Guaranteed Prices/Feed-In 	<ul style="list-style-type: none"> ○ Onshore Wind 	
	Energy Efficiency	<ul style="list-style-type: none"> ○ Non-mandatory targets: energy intensity to fall by 20% and major pollutants discharge by 10% during the 11th Five Year Plan (2006 – 2010) 	<ul style="list-style-type: none"> ○ All / Energy Efficiency 	

India	Policy and Economic Incentives for Investment in Renewable Energy Sources (Model Renewable Energy Law in planning)	<ul style="list-style-type: none"> o FDI & Joint Ventures o Depreciation Allowance o Income Tax Holiday o Excise & Customs Incentives o Planning Exemptions o Loans o Feed-in tariffs due to be introduced for wind and solar (announced May 2007) 	<ul style="list-style-type: none"> o All technologies simultaneously 	10% of additional electricity capacity by 2012 (excluding large hydro): increasing to 20% by 2020 10GW RE by 2012
	Incentives for Investment in Wind Power Generation	<ul style="list-style-type: none"> o Concessional Import Duties o Accelerated Depreciation o Sales Tax & Excise Duty Relief o Soft Loans o Income Tax Holiday o Wheeling Charges o Buy-Back Facility o 5% Annual Tariff Escalation o Financial Incentives for Demonstration Projects 	<ul style="list-style-type: none"> o Wind 	
	Incentives for Investment in Small Hydro Power Generation	<ul style="list-style-type: none"> o Survey & Investigation Subsidies o Project Development Subsidies o Renovation, Modernisation & Capacity Upgrade financial support o Term loans 	<ul style="list-style-type: none"> o Small Hydro Power 	
Mexico	Accelerated Depreciation for Environmental Investment (Renewable Energy Law in Congress - not yet implemented)	<ul style="list-style-type: none"> o Investment Tax Credits o Tax Credits 	<ul style="list-style-type: none"> o All technologies simultaneously 	
	Grid Interconnection Contract for Renewable Energy	<ul style="list-style-type: none"> o Regulatory & Administrative Affairs 	<ul style="list-style-type: none"> o Hydropower o Offshore Wind o Onshore Wind o Solar Photovoltaics o Solar Concentrating Power 	
	Project of Bill to Promote Renewable Energy	<ul style="list-style-type: none"> o General Energy Policy 	<ul style="list-style-type: none"> o All technologies simultaneously 	
	Project of Ecological Norm for Wind Farms	<ul style="list-style-type: none"> o Regulatory & Administrative Affairs 	<ul style="list-style-type: none"> o Onshore Wind 	
	Project of Electricity Reform in Connection with Renewable Energy	<ul style="list-style-type: none"> o Regulatory & Administrative Affairs 	<ul style="list-style-type: none"> o All technologies simultaneously 	
	Public Electricity Services Law	<ul style="list-style-type: none"> o General Energy Policy 	<ul style="list-style-type: none"> o All technologies simultaneously 	
	Methodology to Establish Service Charges for	<ul style="list-style-type: none"> o Regulatory & Administrative Affairs 	<ul style="list-style-type: none"> o All technologies simultaneously 	

	Transmission of Renewable Energy			
	Wheeling Service Agreement for Electricity from Renewable Energy Sources	<ul style="list-style-type: none"> ○ Regulatory & Administrative Affairs 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	
Thailand	Strategic Plan for Renewable Energy Development	<ul style="list-style-type: none"> ○ General Energy Policy ○ Machinery Import Duty Exemptions ○ Corporate Income Tax Exemption 	<ul style="list-style-type: none"> ○ Solar ○ Wind ○ Biomass ○ Biogas ○ Hydro ○ Biofuels ○ Geothermal ○ Fuel Cells ○ Energy Efficiency 	8% of primary energy by 2011 (excluding rural biomass)
Turkey	Electricity Market Licensing Regulation	<ul style="list-style-type: none"> ○ Capital Grants 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	Targeted 2% of electricity from wind by 2010
	Law on Utilisation of Renewable Energy Resources for the Purpose of Generating Electrical Energy – No. 5346	<ul style="list-style-type: none"> ○ General Energy Policy 	<ul style="list-style-type: none"> ○ All technologies simultaneously 	
Source: IEA, New Energy Finance, MNRE, MMDT				

Appendix 8B: Summary of Major Policy Recommendations Across Mitigation and Adaptation Sectors

Source: Adapted from review of sectoral papers prepared on mitigation and adaptation

	Mitigation/ Industry	Mitigation/ Forestry	Mitigation/ Agriculture	Investment in RE/EE
Information gaps				
Required disclosure	Product labeling			
Voluntary reporting	EE certification Green bldg stnds	Wood certification	Ag product certification	
Govt provided info	EE performance/ options	Sustainable mgmt	Sustainable mgmt	Incubator support (info/networks)
Policy barriers to entry				
Monopoly regulation	Utility EE investmnt			Leveling field Feed-in tariffs Cnnxn Reqs
Perverse subsidies	↓ for energy use	↓ for forest clearance		
Perverse standards	Building codes Zoning for density			Expedited permitting
Externalized costs				
Civil liability				
Command & control	EE perf standards	Bans on illegal logging	Farming practices/ inputs/emissions	Portfolio standards Fuel standards
Taxes/charges	Energy pricing			Carbon tax
Externalized benefits				
Tradable rights	White tags	REDD/For. mgt Afforesta/reforesta Energy/structural products	Reduced tillage Increased storage Animal wastes Bioenergy crops	Carbon market expansion
Govt incentives	Early retirement EE equipment purch	Sustainable land mgmt/ecosys servs	Land restoration EE equipment	RE/EE technologies & projects Retail fin models
Govt provision	R&D on EE techs Public buildings	Protected areas Procurement	Procurement	R&D on new techs Public procurement
Other?		Forest Financing Mechanism: grants		
Other comments on sector, policies and markets	Hugely decentralized sector Split incentives builders/occupants Need integrated approach to bldg EE Much investment from retained earnings	Land tenure a major issue in tropics Most investment not related to climate Most from private sector Need devolve authority/funds	Need understand global ag markets Lots of energy in ag production/ transport No baseline/ mitigation scenarios	Mainstream EE/RE Policy-driven market Lacking projects, not finance

	Mitigation/ Transport	Adaptation/ Infrastructure	Adaptation/ Ecosystems	Adaptation/ Water
Information gaps				
Required disclosure	Fuel use for autos	In EIAs for bldngs		Wtr use efficiency
Voluntary reporting		Green buildings		
Govt provided info	Transport options	Adaptation plans Warnings/responses to weather events	Value of ecosystems	Weather forecasts Climate awareness Drought mgmt plans
Policy barriers to entry				
Monopoly regulation				
Perverse subsidies	↓ for energy use, highways, sprawl	↓ for bldngs in low areas	↓ for ag expansion, energy, transport, drainage, water	↓ for inefficient water use
Perverse standards	Land use/sprawl	Building codes	Land use/sprawl	Building codes
Externalized costs				
Civil liability			For damage to ecosystems	
Command & control	Vehicle standards Fuel standards Land use controls	Storm water clxn Limits on building locations Building stnds	Pollution/land use/ species controls	Efficiency/reuse standards Watershed land mgmt stnds
Taxes/charges	Congestion charges Fuel taxes	For new devs in low areas	On forest conversion	For water use; income support
Externalized benefits				
Tradable rights	Fleet efficiency		For ecosystem services/REDD	Water banking/trading
Govt incentives	EE transit technols	Insurance products	For habitat restora/ protection	Efficiency/reuse investments
Govt provision	Mass transit R&D in technols	Responses to weather events	Protected areas	Desalination Reservoirs/networks Forested watersheds
Other comments on sector, policies and markets		Capacity/willingness to act (nat'l/local): adaptation deficit Need mainstream Durban Adaptation Strategy: across city Int'l > local costings Need local studies		Mostly public domestic sources Long-lived assets, major inv risks Intensely politica

	Adaptation/ Agriculture	Adaptation/Health	Energy Subsidies
Information gaps			
Required disclosure			
Voluntary reporting			
Govt provided info	Disaster mitigation/ adaptation/land use planning/modeling Climate forecasts Pest/disease trackng Training/cap bldng	Promote health programs	Communications re changes in subsidy programs
Barriers to entry			
Monopoly regulation			Allow access to grid, pricing
Perverse Subsidies	Excessive wtr use		Eliminate for fossil fuels
Perverse standards			Reduce trade restrictions
Externalized costs			
Civil liability			
Command & control	Ban illegal logging Controls on land use Product storage reqs		RE portfolio standards
Taxes/charges	Excessive wtr use		Carbon taxes
Externalized benefits			
Tradable rights	Water rights		
Govt incentives	Efficient wtr use Transition support		Add for RE/EE
Govt provision	R&D on methods/ crop lines Protected areas Climate insurance	Immunizations Water supply & sanitation	Direct income support Shift R&D to RE/EE
Other comments on sector, policies and markets	Adaptation actions not in response to climate alone – need mainstream Adaptive cap varies Land tenure an issue in tropics		Phasing/timing of subsidies key