

Chapter VI

Financing the development response to climate change

Introduction

There is no way round the need for large-scale investments to meet the climate challenge, in both developed and developing countries. Developed countries have begun to make the required adjustments focusing, in particular, on energy efficiency. However, and despite their expressions of concern and commitment, the pace has been slow. In 2008 and 2009, the inclusion of green investments in stimulus packages in response to the global financial crisis has raised expectations that a more sustained effort is now under way in those countries. Still, their policymakers need to think on a much larger scale when it comes to emission cuts.

Developing countries can be expected to follow the lead of the developed countries only if the latter's response is consistent with long-standing growth and development objectives. The present *Survey* has suggested that the key to its being so lies in the adoption of an investment-led and integrated approach. In particular, large-scale investments will need to be front-loaded to ensure the achievement of a “big push” into the generation of low-emissions energy sources and the mitigation of and adaptation to climatic threats and shocks. These investments, however, will involve significant initial costs and carry a high degree of uncertainty.

The economic debate within the global discussion of climate policy has been dominated by assessments of market-based mechanisms such as cap and trade and carbon taxation, both aiming at changing price incentives so that investments in energy efficiency and renewables become more attractive. Private investment will, of course, have a predominant role in any low-emissions economic future and there is little doubt that establishing a realistic price for carbon will have to be part of any policy agenda. The question, however, is whether such mechanisms can induce the required shifts in production and consumption patterns and mobilize the large-scale investments needed to avert the catastrophic risk that climate change poses, as well as ensure that the adjustments take place in a fair and orderly manner. This seems doubtful. It is generally recognized that price mechanisms are an unreliable guide in cases where the investments to be undertaken are on a very large scale and where returns are not immediately visible, are unpredictable and are dependent on a series of complementary investment efforts and policy initiatives (DeLong, 2005). This is all the more true today, where the marriage of the climate and development challenges is taking place against the backdrop of systemic financial market failure and where carbon markets are exhibiting a degree of price volatility which is not compatible with long-term investment planning (Nell, Semmler and Rezai, 2009).

While market mechanisms should be assigned their role in a more comprehensive package of measures, the kind of investment path to be followed to meet the climate challenge will require heavy reliance on regulation and large-scale public investments in order for the necessary transformative shift to take place.

Historically, public investment, financed both by tax revenues and by long-term borrowing, has played a transformative role in shaping development pathways,

Large-scale investments will need to be front-loaded

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including in today's most advanced economies (Rohatyn, 2009). In many cases, external financial support has been critical. Achievement of the transition to a low-emissions, high-growth path in developing countries will also require massive public investment in most cases, funded to a large extent through external resources, particularly in the early stages. Together with achievement of non-marginal changes in the cost of carbon emissions, the aim of such investments will be to crowd in profitable investment opportunities for the private sector along the new development pathway.

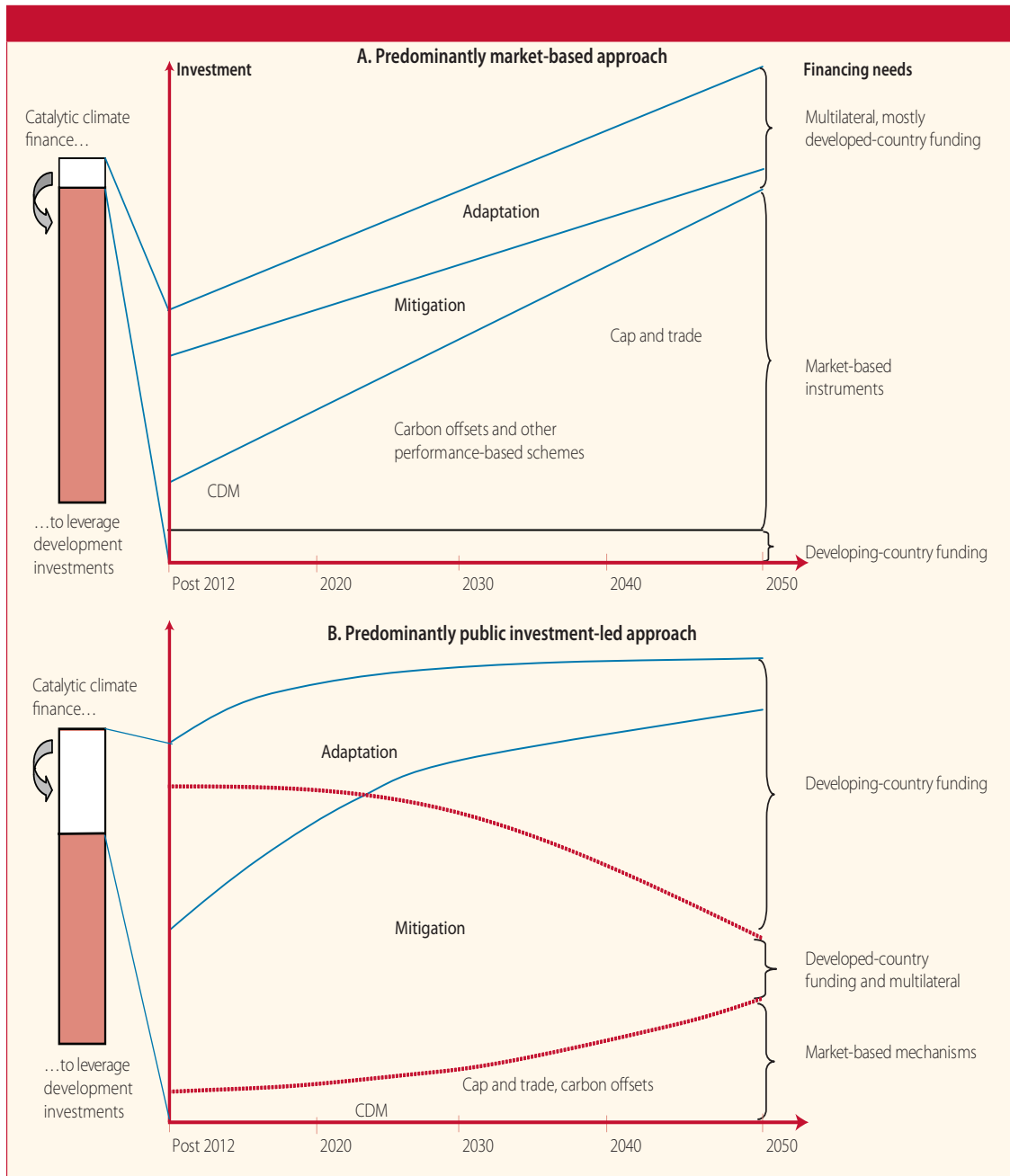
Given the great uncertainties regarding the precise costs and the effectiveness of the types of measures mentioned so far, it is not easy to define an appropriate financing framework for climate change. Depending on what target is used for stabilizing greenhouse gas (GHG) concentrations and what assumptions are made about the effectiveness of the measures, estimates of the annual cost of mitigation range from as little as 0.2 per cent to as much as 2 per cent of world gross product (WGP) by 2030. In all cases, however, doing nothing would lead to much higher economic losses. Adaptation costs are particularly uncertain, with upper-bound estimates for additional annual investments set at about \$170 billion by 2030. On this order of magnitude, addressing climate change seems quite affordable. However, most of these estimates seem to understate the scale of adjustments that will need to be taken. They appear to have taken into account neither the larger global macroeconomic setting in which it is presumed that a new investment path will take shape and, in particular, the constraints many developing countries face in raising investment levels, nor whether those investments have the potential to trigger a high-growth pathway along which countries can meet long-standing development goals.

The key issues with regard to finding the right financing framework are, first, what measures will be most effective in both mobilizing the required amount of resources and steering investments in the desired direction; and second, how the costs should be distributed

The key issues with regard to finding the right financing framework are, first, what measures will be most effective in both mobilizing the required amount of resources and steering investments in the desired direction; and second, how the costs should be distributed across nations and population groups. The first issue may be framed along the lines suggested by figure VI.1, which depicts various mechanisms for covering the estimated costs of the climate challenge and their evolution over time. Figure VI.1.A, derived from a World Bank study (World Bank, 2009), depicts a rapidly growing role, albeit tentative for market-based mechanisms, complemented by a more measured increase in multilateral funding. Together, market-based mechanisms and multilateral funding would quickly establish the right climate for private investment. Based on the analysis in the previous chapters, this *Survey* would suggest a somewhat different structure. As depicted in figure VI.1.B, the required reductions in greenhouse gas emissions will require large-scale upfront investments to generate a non-marginal push in the desired direction, led by public investments and strong shifts in incentives to crowd in private investments.

The present chapter begins by assessing the likely scale of resources needed to achieve low-emissions, high-growth pathways, and to make vulnerable countries and communities more resilient with respect to climate change and shocks. It then considers how those resources could be mobilized and, in particular, both the advantages and the limitations of cap-and-trade mechanisms and carbon taxes as financing vehicles in the initial stages of shifting to the new pathway. A wide mix of financial mechanisms will likely be required, including through domestic resource mobilization. The chapter concludes with a consideration of the elements of an alternative global investment regime, initially dependent on significant public sector involvement and a prominent role for a multilateral financing mechanism.

Figure VI.1
Strategic investment and financing mechanisms for developing countries



Sources: World Bank (2009), for figure VI.1A; and United Nations, Department of Economic and Social Affairs, for figure VI.1B.

Estimating financing requirements

The longer the response to climate change is delayed, the more damaging will be the threats to lives and livelihoods, and the greater will be the resources required to respond to those threats

The parties to the United Nations Framework Convention on Climate Change¹ agreed (article 4.3) that developed countries would have to provide financial resources to developing countries to meet “agreed full incremental costs” of implementing mitigation and adaptation activities as well as related activities encompassing, inter alia, climate research, training and management of sinks. These, it should be noted, are not voluntary commitments but treaty obligations. However, estimates of those global costs vary widely depending upon the assumptions made about the required emissions target, and the complex feedback linkages between economic and climatic conditions, among other factors (see chap. I). What is certain is that the longer the response to climate change is delayed, the more damaging will be the threats to lives and livelihoods, and the greater will be the resources required to respond to those threats. In this respect, Stern (2009, p. 12) correctly argues that the “ratchet effect” linked to the growing stock of greenhouse gases in the atmosphere, coupled with long investment lifetimes, implies that “decisions, plans and incentive structures we make and create in the coming months and years will have a profound effect on the future of the planet” (see also chap. II). It is also important to recognize that there will not be a single mix of decisions, plans and incentives across all countries and, in particular, there will likely be some sharp differences between developed and developing economies, given the higher mitigation and adaptation costs facing the latter.

Mitigation costs

Figure VI.2 and table VI.1 present some recent estimates of mitigation costs. Given the uncertainties and unknowns in these costing exercises, it is not surprising to find the range varying from as little as 0.2 to about 2 per cent of WGP, or between \$180 billion and \$1.2 trillion per annum (by 2030). The range of estimates depends on methodologies used as well as on whether the target of stabilization of greenhouse gas concentrations is set at 450 parts per million (ppm) or 550 ppm. In all cases, the costs are considerably higher under a business-as-usual scenario, in which case permanent losses of projected WGP could be as high as 20 percent.

United Nations, United Nations Framework Convention on Climate Change (2008, table 4) provides a near lower-bound estimate of \$200 billion-\$210 billion in additional investment and financial flows globally in 2030 for mitigation efforts that cut CO₂ emissions by 25 per cent below 2000 levels by 2030. The McKinsey study estimates that the figure could rise to as high as \$800 billion for the 450 ppm target, more than half of which would be in developing countries.² Stern’s latest estimate calls for an even bigger push, as he puts the additional cost at between \$600 billion and \$1.2 trillion depending on whether the target is, respectively, 550 ppm or 450 ppm (figure VI.2 and Stern 2009).

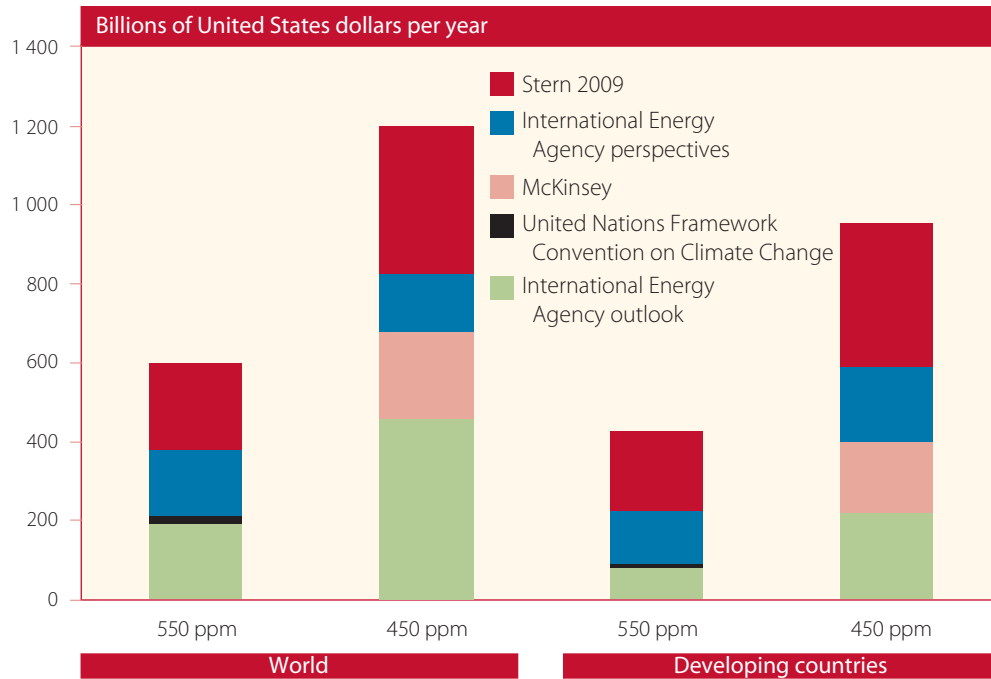
More than half of the incremental costs of greenhouse gas abatement are expected to fall on developing countries, whose energy investments over the coming decades are projected to grow much faster than those of developed countries (see chap. II). Among the incremental costs are those associated with investments in: renewable energy, which at

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¹ United Nations, *Treaty Series*, vol. 1771, No. 30822.

² However, operating and maintenance costs are not included in these figures. Actual costs for mitigation efforts might therefore be even higher. The International Energy Agency (2008b) has, for example, estimated that owing to higher capital costs for energy supply facilities, total additional investment needed in 2030 to reduce energy-related CO₂ emissions alone would be about 170 per cent higher than in earlier estimates.

Figure VI.2
Range of estimates of annual additional cost of mitigation strategies,
550 ppm and 450 ppm scenarios, world and developing countries



Sources: Stern (2009); International Energy Agency (2008a and b); United Nations, United Nations Framework Convention on Climate Change (2008); and McKinsey & Company (2009).

current prices remains a more costly source of electricity than coal or other fossil-fuel alternatives; more efficient and other lower-emitting coal-based power plants, including integrated gasification combined cycles and supercritical coal power plants; carbon capture and storage; and more energy-efficient boilers, furnaces and other industrial equipment. However, from a development perspective, it is very difficult to separate these incremental investments from the bigger investment challenge of meeting growing energy demand in developing countries, as well as interrelated demands on the transportation system and in urban expansion, improved irrigation and water management to strengthen the productivity of the rural economy, and so forth.

Adaptation costs

Estimates of adaptation costs have focused on the additional amount of investment needed to reduce the impact of anticipated future damages caused by weather events, in terms mainly of measures to increase resilience and reduce the impact of disasters. In addition, adaptation costs may also include coping and relief expenditures when damages actually occur. However, because these costs depend on the probability and severity of climatic threats, whose impact is closely linked to other vulnerabilities, it can be difficult to determine where traditional development expenditures end and new adaptation expenditures begin (see chap. IV; McGray and others, 2007; and Bapna and McGray, 2009).

Estimating the costs of adaptation with precision is even more difficult, not only because adaptation measures will be widespread and heterogeneous, but also because these measures need to be embedded in broader development strategies, as discussed in chapter III. The United Nations Framework Convention on Climate Change secretariat estimates that additional annual investment and financial flows needed worldwide would be in the

Table VI.1
Range of estimates of global mitigation costs according to various studies

Study	Estimate (percentage of WGP)	Estimate (US dollars)	Main characteristics
Intergovernmental Panel on Climate Change (2007d)	0.2-0.6 per cent (median of WGP reduction); 0.6-3 per cent (minimum and maximum estimate of WGP reduction)		<ul style="list-style-type: none"> Estimates the global macroeconomic cost in 2030 for least-cost trajectories towards given long-term stabilization levels Lower stabilization levels imply higher GDP reductions
Stern (2006 and 2009)	Annual investment costs: 1 per cent of WGP, revised upwards to 2 per cent; costs of inaction: 5-20 per cent of WGP reduction by 2050	<ul style="list-style-type: none"> 500 ppm: 1,200 billion/year 500 ppm: 600 billion/year 	<ul style="list-style-type: none"> Compares investment costs of mitigation with the cost of inaction in order to assess the cost-benefit of acting against climate change Aggregates several previous studies in a model to estimate the costs; does not provide new estimates Methodology and model assumptions are the target of criticisms
Vattenfall (2007)	0.6-1.4 per cent of WGP by 2030		<ul style="list-style-type: none"> More accurate methodology for assessing the cost-benefit of a group of policies and interventions to mitigate climate change
McKinsey (2009)	Annual investment costs: 1.3 per cent of forecasted WGP in 2030	<ul style="list-style-type: none"> 450 ppm: 680 billion/year 	<ul style="list-style-type: none"> Disaggregates the abatement potential and costs by economic sector and geographical region Presents accurate sensitivity analysis with respect to different core parameters Presents different abatement opportunities and assesses the potential contribution of each one

Sources: United Nations Development Programme (2007a); United Nations, United Nations Framework Convention on Climate Change (2008); Intergovernmental Panel on Climate Change (2007d); Stern (2006); Vattenfall (2007); and McKinsey & Company (2009).

order of \$49 billion-\$171 billion by 2030 (see table VI.2). Its adaptation scenario covers five sectors, with the largest element of uncertainty in this estimate lying in the cost of adapting infrastructure, which may range between \$8 billion and \$130 billion. Other sources have produced similar estimates for adaptation. *Human Development Report 2007/2008* (United Nations Development Programme, 2007a) estimates that annual adaptation investment needs would reach \$86 billion by 2015, while recent calculations of the World Bank (2009) put annual adaptation costs in the range of \$10 billion-\$40 billion by 2030.

Table VI.2.
**Additional investment and financial flows needed
 for adaptation in 2030, by sector**

<i>Sector</i>	<i>Areas/adaptation measures considered</i>	<i>Global cost (billions of 2005 United States dollars)</i>	<i>Proportion needed in developing countries (percentage)</i>
Agriculture, forestry and fisheries	Production and processing, research and development, extension activities	14	50
Water supply	Water supply infrastructure	11	80
Human health	Treating increased cases of diarrhoeal disease, malnutrition and malaria	5	100
Coastal zones	Beach nourishment and dykes	11	45
Infrastructure	New infrastructure	8–130	25
Total		49–171	34–57

Source: United Nations, United Nations Framework Convention on Climate Change (2008, table 5).

The financing challenge

The estimated additional investments needed for adaptation and mitigation to address climate change are large in absolute terms. Still, it is often pointed out that these are only a small fraction of world output (in the order of 1 and 2 per cent of WGP) and of estimated total global investment (2.5–5.0 per cent) in 2030. There is, however, a growing recognition that many of these investments need to be front-loaded, both to effectuate the urgent shift to a low-emissions economy and to minimize the damage from unavoidable changes in the climate. Front-loading implies much more pressure on the financial system in mobilizing the required resources. Moreover, as suggested in earlier chapters, these additional investments in adaptation and mitigation are often closely interrelated and will make sense only in combination with complementary investments designed to meet wider development objectives, such as developing infrastructure, raising agricultural productivity and diversifying economic activity.

Despite the recent proliferation of climate-related funds, the amount currently promised and expected to be available for meeting the climate challenge in the near term, from bilateral and multilateral sources, is woefully inadequate. Current dedicated climate resources have been estimated at about \$21 billion and are very heavily skewed towards mitigation (table VI.3). The total amount of climate financing will be a large multiple of that figure, and on some estimates could be 9–10 times the 2008 levels of official development assistance (ODA).

The difficulty involved in reaching even those levels of ODA suggests that global financing for climate change will require a much more determined effort on the part of advanced countries to provide bold leadership on the climate issue and bolster international cooperation. But it will also require an effort on the part of developing countries to mobilize a larger share of their resources for cleaner investments along a new, sustainable growth path.

Investments in adaptation and mitigation are often closely interrelated

The amount available for meeting the climate challenge, from bilateral and multilateral sources, is woefully inadequate

Table VI.3.
Bilateral and multilateral financing mechanisms for mitigation and adaptation in developing countries

Name	Total (millions of United States dollars: exchange rates of November 2008)	Use	Details
Under the United Nations Framework Convention on Climate Change			
GEF-4 ^a	1 030	M	Time frame: 2006-2010; \$352 million already committed as of December 2008
Sustainable Forest Management	154	M	Special programme under GEF-4 for land use, land-use change and forestry
Strategic Priority on Adaptation (SPA)	50	A	Pilot programme on adaptation of the GEF Trust Fund; all resources have been allocated
Special Climate Change Fund (SCCF Adaptation)	90	A	Include pledges as of December 2008; \$68 million has been allocated to 15 projects as of November 2008; operated by GEF
Least Developed Countries' Fund	172	A	Include pledges as of December 2008; \$91.8 million has been received as of November 2008; operated by GEF
Adaptation Fund	400-1 500	A	Time frame: 2008-2012; as of October 2008, \$91.3 million was available (4 million certified emission reductions (CERs) at €17.5 per CER)
Bilateral			
Cool Earth Partnership (Japan)	10 000	A, M	Provides grants and loans; time frame: 2008-2012; up to \$2 billion to improve access to clean energy, and US\$ 8 billion for preferential interest rate loans for mitigation projects
Climate and Forest Initiative (CFI) (Norway)	2 250	M	Provides grants; time frame: 2008-2012; pledged US\$ 102 million to the Amazon Fund
International Window of the Environmental Transformation Fund (ETF-IW) (United Kingdom)	1 182	A, M	Provides grants and loans; time frame: 2008-2010; most of the funds will be allocated through the World Bank Climate Investment Funds
Amazon Fund (Brazil)	1 000	M	So far, only Norway has pledged, in the amount of US\$ 102; donations to be administered by the National Development Bank of Brazil
International Climate Initiative (ICI) (Germany)	764	A, M	Provides grants; funding for the initiative will be generated from auctioning 10 per cent of its allowances from the Emission Trading Scheme of the European Union (EU ETS); it has earmarked up to €120 million for the next five years
International Forest Carbon Initiative (IFCI) (Australia)	129	M	Provides grants; time frame 2007-2011; as of November 2008, US\$ 50 million was allocated
United Nations Development Programme-Spain MDG Achievement Fund - Environment and Climate Change thematic window	90	A, M	Provides grants; time frame: 2007-2010; Spain has pledged €528 to the Fund and US\$ 90 million has been allocated for the Environment and Climate Change thematic window
Global Climate Change Alliance (GCCA) (European Commission)	76	A, M	Provides grants; time frame: 2007-2011; targets most vulnerable countries (least developed countries and small islands)

Table VI.3 (cont'd)			
Name	Total (millions of United States dollars: exchange rates of November 2008)	Use	Details
Multilateral			
Forest Carbon Partnership Facility (World Bank)	300	M	Provides grants and loans; time frame 2008-2020
Global Facility for Disaster Reduction and Recovery (GFDRR)	84	A	Provides grants; time frame 2007-2010; targets high-risk low- and middle-income countries to mainstream disaster reduction in development strategies
United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD)	35	M	Provides grants; administered by the UNDP; Norway, through its Climate and Forest Initiative, is the first donor, with US\$ 12 million
Climate Investment Funds:	6 340	M	Time frame: 2009-2012; administered by the World Bank
• Clean Technology Fund	4 334		
• Strategic Climate Fund	2 006		
Sustainable Energy and Climate Change Initiative (SECCI)	29	A, M	Provides grants and loans; the fund backs major investments in the development of biofuels, renewable energy, energy efficiency, and a wide range of sustainable energy options

Sources: Adapted and updated from Porter and others (2008); and United Nations, United Nations Framework Convention on Climate Change (2008).

Abbreviations: A, Adaptation; M, Mitigation.

a Fourth replenishment of the Global Environment Facility.

The purpose of a sustained injection of external financing in amounts large enough to give a big push onto a low-emissions development path is to simultaneously accelerate and sustain growth in developing countries at levels higher than in the past. As discussed in earlier chapters, this initial big push from official sources of finance, in combination with various policy mixes, including price incentives, regulation and targeted industrial policies, would begin to raise domestic sources of finance for investment in both the public and the private sectors. The evolving mix of public and private investment will no doubt vary among countries, but for many developing countries, and possibly for some developed countries, public investment will have to take the lead, along with stronger regulations, before large-scale private investment begins to materialize.

A big push from official sources of finance would begin to raise domestic sources of finance for investment in both the public and private sectors

Crowding in private sector resources

A clear-cut objective for policymakers addressing the climate challenge is to reveal the hidden costs in choosing high-emissions over low-emissions technology. In the case of adaptation, incentives will likely involve the sharing of costs among consumers, private operators and Governments (Organization for Economic Cooperation and Development, 2008, p. 124).

Insurance markets offer a possible option and various innovative instruments have been introduced in recent years. However, these instruments still operate on a very limited scale, even in more advanced countries, and tend to be a particularly expensive option in developing countries where coverage is very limited (Barnett and Mahul, 2007; United Nations, 2008).

Voluntary standards do not bite unless accompanied by regulation

Some companies have started to implement voluntary emission caps and a growing number of consumers are adjusting their consumption patterns in order to lower footprint levels. Absent more aggressive government intervention, it is unlikely that these trends will be quantitatively sufficient and timely enough to make a significant impact on greenhouse gas emissions. Voluntary emissions standards may hurt relative competitiveness and increase production costs in the short term, reducing incentives to adopt more stringent standards. The experience of the State of California is perhaps the exception to the rule that voluntary standards will not bite. California's emission standards and reduction targets, obtained by negotiating with private companies, have raised awareness among consumers and producers: average per capita consumption of energy in California is 50 per cent of the United States average. In cooperation with 20 other States, California has also established targets for the use of alternative energy. The California Renewables Portfolio Standard requires the use of 20 per cent renewable energy by 2010. However, these voluntary efforts are in the context of a State with a strong regulatory record on environmental standards.

The present section reviews a range of mechanisms considered thus far that fall broadly in the category of market-based measures, as their main focus is on changing the price of carbon to draw resource allocation away from emission-intensive forms of energy. Several of these mechanisms are also expected to mobilize resources necessary for financing other investments in greater energy efficiency and use of renewable energy, including related public investments.

Market-based incentives for scaling up investment in developing countries

Mitigating climate change using prices is focused on creating economic incentives for consumers and producers to drive greenhouse gas emission reductions

Much of the economic policy debate on climate change has been dominated by the search for market-based solutions to problems of acknowledged market failure. Mitigating climate change using prices is focused on creating economic incentives for consumers and producers to drive greenhouse gas emission reductions, by internalizing externalities so that agents account and pay for their level of emissions, and to do so as efficiently as possible, assuming that all investment opportunities for cutting emissions that cost less than the established price for carbon will be seized.

There are two main groups of instruments for achieving this aim: (a) establishing a price of greenhouse gas emissions, using capital markets to value specific activities and, for adaptation purposes, to price risks through insurance premiums; and (b) imposing taxes, fees and levies on inputs, final products or activities/services. These instruments will no doubt have a role to play in any mix of policy initiatives created to meet the climate challenge. The real question is whether they can acquire the kind of global reach that appears to be necessary if they are to play a lead role in meeting that challenge.

Cap and trade

Pricing greenhouse gas emissions as a pillar of mitigation policy emerged in the early 1990s with the United Nations Framework Convention on Climate Change and took on greater prominence with the legally binding targets to reduce greenhouse emissions set by

the Kyoto Protocol to the United Nations Framework Convention on Climate Change.³ The Protocol (adopted by the Conference of the Parties to the Convention in December 1997) set differentiated targets for industrialized countries, while setting up an emissions trading scheme to meet those targets. A financing mechanism for projects in developing countries, the Clean Development Mechanism (CDM), was launched at the same time.

These mechanisms are essentially designed around a cap-and-trade programme, where Governments set an overall emissions cap and then issue tradable permits to firms which allow them to emit a specified quantity of greenhouse gases. Those that can reduce their emissions more cheaply can sell their allowances. Doing so is expected to promote competition, thereby reducing long-term costs. While the current volume of carbon trading at a little over \$100 billion is still quite small, compared, for instance, with that on financial derivatives markets, according to some it could become the “world’s biggest commodity market” and prospectively the world’s biggest market overall within a decade (Lohmann, 2008). The trading of emission certificates as financial assets and speculative investments can generate a high volatility in the price of carbon. A recent assessment of the European Union (EU) experience with emissions trading found that (between September 2005 and March 2008) the price of carbon was more volatile than stock market indices, with a standard deviation on the return on the emissions price 10 times higher than the return on equity (Nell, Semmler and Rezaei, 2009). Volume instability and price volatility may not provide adequate incentives for long-term investment decisions as a response to climate change on the part of market participants.

On some counts, trading is necessary to advance the serious regulation needed to establish a price for carbon. It is also recognized that the cap-and-trade scheme cannot begin on a global scale, as the trading of permits will initially be confined to developed countries, with developing countries pulled in indirectly through the Clean Development Mechanism by the funding of emissions-reducing projects prior to their participation.

Between 2004 and 2007, the Clean Development Mechanism implemented 700 projects with a total value of \$6 billion for developing countries, albeit with almost 4 out of 5 projects concentrated in just four countries: Brazil, China, India and Mexico (United Nations, United Nations Framework Convention on Climate Change, 2007b, and chap. V). The United Nations Framework Convention on Climate Change secretariat, (United Nations, United Nations Framework Convention on Climate Change, 2008) has estimated that the mitigation potential in 2020 in developing countries will be approximately 7 gigatons of CO₂ equivalent (Gt CO₂e) and that most of the potential projects will be available at a cost of less than \$25 per ton of CO₂e. Total demand for credits for certified emission reductions (CERs) in 2020 is estimated at between 0.5 and 1.7 Gt CO₂e, which could represent \$10 billion-\$34 billion in additional investments in developing countries (New Carbon Finance, 2008; IDE-ACarbon, 2008; Point Carbon, 2008). Moreover, if permits for developed countries are auctioned, this will provide additional financing for mitigation efforts in developing countries.

However, there are serious limitations to the scaling up of this mechanism to generate in a timely manner the required resources for developing countries (Griffith-Jones and others, 2009). The need for effective regulation and monitoring of innovative financial instruments may raise administrative costs and act to deter some, particularly developing, countries. Significantly, the largest carbon market, the Emission Trading Scheme (EU ETS) of the EU, was created by government regulation. Significant investments in training and education are also likely to be required. The success of the sulphur trading scheme in the United States of America certainly appears to have depended on these supportive conditions being in place (see box VI.1).

³ United Nations, *Treaty Series*, vol. 2303, No. 30822.

Box VI.1

Sulphur trading and why it worked

Market mechanisms do not work in a vacuum: they are shaped by many factors. The United States system of sulphur emissions trading, the inspiration for many cap-and-trade proposals, is often credited with having triggered a dramatic reduction in the costs of pollution control. The Clean Air Act Amendments of 1990 had established the system, setting a cap on sulphur emissions at about half of the 1980 emissions and distributing allowances to businesses, roughly in proportion to past emissions. All large stationary sources of sulphur emissions, primarily coal-burning power plants, were included. The trading system was phased in from 1995 to 2000, with costs of controlling sulphur far below the levels that had been anticipated in advance.

However, this result cannot be attributed to trading alone: the low cost made itself apparent quite early, at a time when the volume of emissions trading was quite small. Several other events also played important parts in driving down the costs. Just before trading began, a sharp reduction in railroad freight rates made it affordable to bring low-sulphur coal from Wyoming, replacing high-sulphur coal from the closer Appalachian coalfields, to Midwestern power plants. Some State regulations required even greater sulphur reduction than that stipulated by the national law, so it took no extra effort for power plants in those States to comply with the new national standard. At the same time, prices were declining for scrubbers, the pollution control devices that remove sulphur emissions. In this context, the emissions trading system may have made some contribution to lowering costs, but it operated on a field tilted in its favour. Without all the helpful coincidences, sulphur emissions trading would have looked much less successful.

If the United States sulphur emissions trading experience is the model for the carbon market mechanism, then the most important question about market incentives may be, What other initiatives are needed to complement the market and again tilt the field in favour of success? It is not hard to identify the areas—energy efficiency, and low-carbon and no-carbon energy sources—where investment in research and development are needed. This is not just a matter of costs, but also of opportunities—to create new industries and jobs and to launch a promising new path of technological development.

Source: Ackerman (2009).

While in theory carbon trading sets an absolute limit on a pollutant, the Kyoto Protocol permits developed countries to substitute reductions in their own greenhouse gas emissions by financing projects that reduce emissions in other countries.

From a development perspective, the danger of cap and trade is that it allows richer countries to continue their emitting according to unchanged patterns of consumption and production. This approach arguably takes the attention of these countries away from the more urgent efforts of tackling climate mitigation at home, even as it closes developing countries off from relatively cheap options of future emissions reductions (Banuri and Opschoor, 2007). In this respect, it is important to recognize that the cap-and-trade system has been designed to conform to the policy experience, institutional capacity and economic conditions of rich countries. By default, this provides significant advantages to them, as the essential baseline is the current emissions of the high-emitting countries.

International negotiations are likely to address some of the weaknesses of cap and trade as an approach to climate financing and will probably establish targets by sectors with standardized benchmarks (see, for example, the Harvard Project on International Climate Agreements (2008)). However, even though financial flows and participation levels have grown since their inception, emissions trading and the Clean Development Mechanism have not been particularly effective in encouraging a transition away from fossil energy. To date, the EU scheme has not been effective in reducing emissions among the main traders (Capoor and Ambrosi, 2008; WWF, 2007). Moreover, advocates of cap and trade tend to ignore the long history of successful State regulation of environmental issues

The cap-and-trade system has been designed to conform to the policy experience, institutional capacity and economic conditions of rich countries

Emissions trading and the Clean Development Mechanism have not been particularly effective in encouraging a transition away from fossil energy

which unfolded in the absence of trading schemes, including contemporary successes in conventional pollution regulation (Lohmann, 2006).

Perhaps the more sensible, forward-looking view is to recognize that carbon markets will continue to expand but that the pace and scale will not be sufficient to help developing countries break the financial constraint on proceeding along a low-emissions development pathway.

Carbon taxes

By increasing the cost of emissions to private parties in a more predictable manner than cap and trade, carbon taxes provide the opportunity to both raise public revenues and mitigate climate damage by increasing the cost of emissions to private parties. Their possible advantage lies in the more predictable price impact and the ease of design and administration. On the other hand, they can provoke political resistance.⁴ In mature economies, properly designed carbon taxes could play an important role. In developing countries, their role is likely to be more limited. Hence, proposals by, for example, the International Monetary Fund (IMF) (2008b), for a global tax on carbon as the best means of mitigating climate externalities need to be treated with caution.

Estimates by the United Nations Development Programme (2007a) put the potential revenue at \$265 billion if a \$20 tax per ton of CO₂ is charged in countries members of the Organization for Economic Cooperation and Development (OECD) at current emission levels. Many OECD countries already have carbon taxes aimed mainly at financing their domestic budgets (Organization for Economic Cooperation and Development, 1997), rather than at financing low-emissions development or other public goods. EU also applies differential taxes on energy to products, such as natural gas compared with diesel or petrol, when they are used as motor or heating fuel. It is worth noting that, while these taxes appear to have contributed to energy efficiency, they have hardly been sufficient to counter the threat of warming temperatures.

Other schemes have been proposed to specifically finance climate change activities. A proposal similar to France's solidarity tax, which is intended to finance access to HIV/AIDS treatment in low-income countries, maintains that a \$7 levy per passenger on international flights could result in \$14 billion per year (United Nations Development Programme, 2007a; UNITAID, 2007). Because air fuel is often tax-exempt, such a levy actually reduces the implicit subsidy for air travel relative to other modes of transportation. Reducing subsidies to fossil fuels could help lower emissions and provide incentives for the transition towards a low-emissions economy. Subsidies to oil fuels—the difference between the end-user price and the price in a competitive market—have been estimated at \$300 billion per year or 0.7 per cent of WGP (United Nations Environment Programme, International Labour Organization, and others, 2008). But, particularly in developing countries, raising the price of essential goods (energy as well as food and water) could render them unaffordable by lower income groups. Not only would this be regressive, it would also be socially unacceptable and environmentally unpredictable.

A related mechanism entails imposing fees and levies for activities/services whose benefits are not adequately captured by market prices. Owing to their specificity, ecosystem services cannot be traded as easily as liquid financial assets. As an alternative, several methodologies have been created to assess market value of these services and charge

While carbon taxes appear to have contributed to energy efficiency, they have hardly been sufficient to counter the threat of warming temperatures

⁴ On the political resistance to both cap-and-trade and carbon tax proposals in the United States, see John M. Broder "From a theory to a consensus on emissions", *The New York Times*, 16 May 2009.

the potential beneficiaries, using a “pay as you use the service” approach involving using shadow prices (Costanza and others, 1997). The idea of preserving ecosystems through the use of the services they provide is at the core of the strategies to reduce emissions from deforestation (see box VI.2).

Box VI.2

Financing forests and the reduction of emissions from deforestation and forest degradation (REDD)

In addition to providing multiple services and goods, forests can play a key role in tackling climate change. Forestry, as defined by the Intergovernmental Panel on Climate Change, accounts for about 17.4 per cent of global greenhouse gas emissions, and is therefore the third largest source of anthropogenic greenhouse gas emissions after energy supply and industrial activity. Loss of tropical forest results annually in emissions that are comparable to the total annual CO₂ emissions from the United States of America or China. Emissions from deforestation alone could increase atmospheric carbon stock by about 30 parts per million (ppm) by 2100. In order to stabilize the current CO₂e level of 433 ppm at a targeted 445-490 ppm, forests will need to form a central part of any global climate change deal.

The Stern Review, among other studies, considers curbing deforestation a highly cost-effective and relatively quick way of reducing greenhouse gas emissions. The resources required to halve emissions from the forest sector by 2030 could lie between \$17 billion and \$33 billion per year if forests are included in global carbon trading. If the international community does nothing to bring deforestation to a halt, the global economic cost of climate change caused by the degradation and losses of forests could reach \$1 trillion per year by 2100. This is additional to the cost of the impact of industrial emissions.

At present, only a very small share of the existing investment in the forest sector is allocated to addressing climate change and less than 25 per cent of that share is invested in developing countries and economies in transition. Fortunately, the importance of limiting deforestation and forest degradation has been recognized by climate change negotiators, as reflected in the final outcome of the thirteen session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Bali, Indonesia, from 3-15 December 2007.^a

To fully realize the potential of reducing emissions from deforestation and forest degradation (REDD), several new financing initiatives have been launched. By far the most significant is Norway's commitment to provide \$600 million annually towards efforts to reduce carbon emissions from deforestation and forest degradation in developing countries. Other donors, including Australia, Finland, Spain, Japan, Switzerland, the United Kingdom of Great Britain and Northern Ireland and the United States of America, have contributed or have signalled their intent to contribute funds to climate change and forests programmes.

The World Bank has established the Forest Carbon Partnership Facility to help reduce emissions from deforestation and degradation and to help build capacity for REDD activities in 25 pilot developing countries. The target capitalization is at least \$300 million. The World Bank is also currently developing the Forest Investment Programme to support REDD-related efforts of developing countries, providing upfront bridge financing for readiness reforms and investments identified through national REDD strategies. The targeted level of funding for the proposed Forest Investment Programme is \$500 million.

The Food and Agriculture Organization of the United Nations, the United Nations Development Programme and the United Nations Environment Programme have jointly launched the Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD), including a portfolio of \$52 million (to be financed by Norway), to provide assistance in REDD capacity-building to pilot developing countries. The immediate goal is to assess whether carefully designed payment structures and capacity support can create incentives for emission reductions while maintaining and improving the other ecosystem services that forests provide. To be successful, this initiative warrants the wider participation of United Nations bodies involved in climate change and forests.

^a See, for example, FCCC/CP/2007/6/Add.1, decision 2/CP.13.

Box VI.2 (cont'd)

Development of a REDD mechanism must be based on sound methodologies for estimating and monitoring changes in forest cover and associated carbon stocks and greenhouse gas emissions, incremental changes due to sustainable management of forests, and reduction of emissions due to deforestation and forest degradation. The methodological challenge has proved to be much more difficult for emissions due to forest degradation than for emissions due to deforestation. There are also policy issues that have to be taken into account in the REDD negotiations such as the rights of stakeholders, in particular indigenous peoples, and the opportunity costs of other land uses and forest management systems (see box IV.2).

REDD negotiators should also ensure that the final outcome does not disadvantage countries that have already taken steps to eliminate or reduce deforestation and to manage their forests sustainably, or countries where forests are sustainably managed. The final outcome of the REDD programme should ensure that forest-related climate change options support sustainable development in both forest-rich and forest-poor countries. It should tackle drivers of deforestation that lie outside the forest sector, and support transparent, inclusive and accountable forest governance. It is also crucial to recognize the comprehensiveness of sustainable forest management, which goes beyond emissions and carbon potentials of forests.

Source: UN/DESA, United Nations Forum on Forests Secretariat.

However, the level both of the knowledge required to set an efficient tax and of the capacity needed to administer it are generally quite high and may not yet be achievable by many developing countries. Moreover, as indicated, estimates of damages caused by carbon emissions vary hugely, because of the different assumptions made in order to value inter-temporal trade-offs or non-monetary damages, or to account for incomplete information and uncertainty (Schroeder, 2008).

Any global carbon tax would require multilateral cooperation to harmonize tax systems so as to facilitate a joint decision on the level and incidence of the tax and on how to allocate the revenues. Without a robust international framework, differentiated taxes may serve discriminatory political or trade objectives instead of furthering climate change mitigation (as in the case, for example, of United States subsidies to ethanol and barriers to Brazil's ethanol exports). The idea, moreover, of stripping national authorities of their powers in this regard has met with stubborn resistance in a number of countries.

An unavoidable feature of a uniform global carbon tax, even if it were to be introduced gradually, would be the taxation of developing countries at several times the rate of industrialized countries, measured as a proportion of GDP. This would impose a disproportionate burden of adjustment on developing countries, although per capita emissions in developing countries are low compared with those in industrialized ones.

Moreover, carbon pricing will affect the level and distribution of real household income, both directly through a household's use of fossil fuels and indirectly through the prices of other commodities. A carbon tax has been found to place a disproportionately heavy burden on low-income groups in some contexts, by raising not only the direct cost of energy but all final prices for goods in which that energy has been used. In such cases, lower-income households would pay disproportionately more in environmental compliance costs. In order to avoid undesired distributional effects, one option would be to introduce differentiated pricing (and hence taxation) by, for example, increasing prices commensurate with the amount of energy used; alternatively, compensatory mechanisms in the form of subsidies for lower-income groups could be put in place.

Carbon taxation would therefore need to be in the first instance an instrument for providing incentives towards mitigation in advanced countries and a source of financing of climate-related programmes of action, including in developing countries. Potentially, this could yield significant resources to cover international funding requirements.

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With a carbon price of \$50 per ton of CO₂, renewable energy like onshore wind would be roughly competitive with dirty coal; and with oil prices at \$150 a barrel, wind would be competitive with coal and gas, in the absence of a carbon price (Stern, 2009, p. 43). Even without a market-determined carbon price, taxing greenhouse gas emitting sources of energy would help make renewable sources economically more attractive. A tax of \$50 per ton, through which many renewables would become economically viable, could mobilize \$500 billion in resources annually and suffice to cover part of the mitigation costs according to the higher estimates reported in figure VI.2.⁵ Carbon taxes will not provide an unlimited source of funding and will drop off as greenhouse gas emissions are effectively reduced to low levels, but in the initial stages, they may play an important role in sourcing a substantial part of the investment costs of the big push that needs to be accomplished in the coming decades.

Sources of “green” investment

Foreign direct investment, portfolio investment, microfinance and public-private partnerships could be promoted to scale up private financing for climate change mitigation and adaptation

Equity markets could provide another mechanism for mobilizing private financing for investments in green technologies and low-emissions energy sources and infrastructure and for transfers of resources to developing countries. Incentives structures would need to shift so as to favour such investments, which could be achieved if reduction targets are clear and sufficiently aggressive to produce a price of carbon high enough to raise the profitability of alternative, low-emissions investments or if there were fiscal incentives and public investments to raise the rate of return on “green” investments equally. Foreign direct investment (FDI), portfolio investment, microfinance and public-private partnerships could be promoted to scale up private financing for climate change mitigation and adaptation.

Foreign direct investment can be a relatively stable source of financing, with advantages in terms of transferring technology and standards which could allow for leap-frogging into some cleaner sectors such as renewable energy. Some of the big emitting sectors, such as road transport, metals, mining chemical, timber, cement, etc., are dominated by large international firms. Their investments and practices will likely have a big influence on the timing of alternative development pathways (Goldman Sachs, 2008). Moreover, given the advances in clean technologies made by some developing countries in, for example, wind technology, South-South FDI may be an important component of a new development pathway. However, given that FDI tends to lag rather than lead economic growth, it is unlikely to play a significant role in the early stages of a shift onto such a development pathway, particularly given the initial high degree of uncertainty and the absence of the domestic inputs and complementary investments that large international firms, particularly in high-technology activities, need in order to operate efficiently. Moreover, as discussed in the previous chapters, its contribution will depend on effective policy action by the Government of the host country.

Portfolio investments may be mobilized through venture capital funds as well as “green” funds and stocks and could appeal to those investors willing to allocate their investments to options that might generate less return but would have potential in terms of mitigation and socially responsible business practices. However, the funds made available through this channel to developing countries so far have been both limited and skewed in favour of one or two countries. Without other conditioning factors, the amount of resources that can be raised is likely to remain quite small. First, without a sufficient rise in

⁵ As there is a strong likelihood, of course, that developed countries would need some of the revenues to offset the costs of their own adjustment to a low emissions future, the idea that all the revenue raised would go to investment in mitigation, let alone to developing countries, needs to be qualified.

the price of carbon and government intervention through regulatory measures and fiscal incentives, the private sector will not find these instruments sufficiently attractive based on the standard risk-return calculus. For example, the value of equity investments in biofuels has recently fallen as a result of lower energy demand and oil prices. Second, in order for this to become an important vehicle for investment in developing countries, the supply of climate-accountable financial instruments has to increase significantly. Currently, almost all investment opportunities are concentrated in developed countries.

Nonetheless, some private equity investment firms that are focused on climate change mitigation are beginning to perceive clean infrastructure, primarily renewable energy, as offering viable financing opportunities.⁶ This is taking place on a limited scale, however, even in fast-growing developing countries (like China, India and Brazil), as they are all still faced with deficiencies in terms of an infrastructure adequate enough to support production and distribution of renewable energy. Although China is likely the largest market for this type of private financial flow, there remain challenges to private investment because of national policies requiring links with firms based in China. Nevertheless, an increasing number of investment banks are beginning to see increasing opportunities, most likely because of renewable energy quotas and feed-in tariffs rewarding investment in this area, and investors are beginning to act on these prospects. Again, this trend underscores the need for rapid action in policy creation; private investors, particularly in this market, may take significant time to respond to incentives.

Microfinance could be another vehicle for mobilizing local private resources for investments in sustainable development. Over the past three decades, microfinance has grown dramatically. According to recent estimates, there were more than 7,000 microcredit institutions in 2006, serving about 80 million people in about 65 countries, including some developed ones. Microfinance has expanded beyond merely encompassing programmes of credit provisioning so as to now include schemes of microsavings and microinsurance. Some of these schemes already have a climate dimension. Given the close links between poverty reduction and climate vulnerability, scaling up microfinance has been considered a possible source of finance for climate adaptation (Hammill, Matthew and McCarter, 2008). The Grameen Bank has already begun to extend loans for clean energy products, such as solar home systems, with spin-offs to microenterprises, while further opportunities exist in cleaner cooking products, biofuels and low-emissions agriculture (Rippey, 2009). However, scaling up microfinance for long-term investment in productive activities and sustainable development will require support through a broader development strategy, including investments in infrastructure and human capital (United Nations, 2008).

Public-private partnerships and guarantees can provide meaningful support to stimulating private financing in projects for increasing energy efficiency and renewable energy in developing countries. Partnerships have assumed growing importance in recent years as a vehicle for infrastructure projects and delivery of health services (Nikolic and Maikisch, 2006). They have also been used to bolster technological development, including in the field of clean energy (Sagar, Bremner and Grubb, 2008). However, there are doubts about their cost-effectiveness and whether they represent the best way to deliver at scale.

Guarantees can take various forms. A consumer financing programme for solar photovoltaic systems in southern India is a good example of a case where Government-guaranteed credits helped overcome lack of access of consumers to what was needed to allow them to make the necessary upfront investments for using the solar energy (see box VI.3). Lack of knowledge or experience may also create barriers to investments in

Some private equity investment firms that are focused on climate change mitigation are beginning to perceive clean infrastructure, primarily renewable energy, as offering viable financing opportunities

Scaling up microfinance for long-term investment in productive activities and sustainable development will require support through a broader development strategy

⁶ For example, Climate Change Capital, a London-based investment private equity firm, is currently working on launching a China-based clean infrastructure fund.

Box VI.3

Establishing a consumer financing programme for solar photovoltaic (PV) systems in southern India

The low rate of access to electricity, and shortages even when electricity is available, have led households of India to look to alternative power supply systems such as inverters, diesel generators and, in some rare cases, solar photovoltaic (PV) systems. Though India has one of the most comprehensive renewable energy development programmes among the developing countries (see chap. IV), several barriers have prevented the wider adoption of solar home systems which could provide clean energy for lighting. In particular, a combination of insufficient credit and lack of awareness about solar home systems among potential customers has restricted market development. The United Nations Environment Programme (UNEP) in collaboration with local stakeholders has established a programme to increase access by rural households to credit to allow them to buy solar home systems. The objective was to help India's banking partners develop lending portfolios specifically targeted at financing solar home systems in poorly served regions of southern India, including, in particular, poor households in rural and semi-urban areas, which bear the brunt of power shortages and have limited access to expensive alternatives. The project was initiated in 2002 and completed in 2007.

An important step in the course of the project was consultation with stakeholders, particularly potential bank partners and vendors. After consultations, an interest rate subsidy was decided on as the financial mechanism of the project. By providing loans with an interest rate buy-down, the project addressed the "high upfront cost" and the high credit cost, which were the barriers identified by stakeholders. The project was also expected to help increase awareness and confidence in solar home systems technology, bring down the financing costs of the technology in India, and widen the market.

The project was formally launched by the partner banks in 2003: in April by the Canara Bank and in June by the Syndicate Bank. Four solar vendors had met the qualification criteria and could send their customers either to Canara or to Syndicate Bank branches for solar home systems financing. Prior to the launching of the project, only about 1,400 solar home systems had been financed in Karnataka. The project plan had set an ambitious target of 18,000 over the project lifetime. By the time the project ended in May 2007, more than 19,000 loans had been financed, through more than 2,000 participating bank branches, the fastest growth having been in rural areas, in part owing to the increasing participation of the nine Grameen banks.

A properly designed programme, involving stakeholders both during the design and execution stages, can help develop markets for renewable energy, as is evident from the success of India's solar project. Continuous monitoring and involvement of stakeholders at all stages of execution were the key to the success of the programme. The longer-term success of any such programme is dependent, however, on its ability to transit smoothly to the commercial market.

Source: UNEP, Risø Centre.

renewable energy. The International Finance Corporation (IFC), the private sector arm of the World Bank Group has been particularly innovative in this area. By establishing partnerships with banks in developing countries, IFC helps local financial institutions identify which of their clients could implement energy efficiency programmes. When a loan is given, training is provided on how to structure those programmes to further encourage investments, IFC also issues a partial risk guarantee against default. In practice, default rates are significantly lower for energy efficiency projects than for those in other sectors.⁷ The guarantees and training thus seem to have been conducive to an efficient use of IFC resources, helping the private sector overcome its initial reluctance to invest in energy efficiency and renewable energy sectors in developing countries.

⁷ Information based on consultations with IFC staff.

Public sector financing

As noted elsewhere (United Nations, 2006, chap. IV), in many developing countries the markets for long-term financing, such as bond markets, are weakly developed. This typically limits both Governments and private investors with respect to mobilizing enough long-term finance to be able to undertake the large-scale investments necessary for economic and social development. Such investment costs may be too large for Governments to finance from yearly tax revenue, while the lack of a bond market limits the capacity for domestic public borrowing for these purposes. Private investors, in turn, will anticipate returns below social returns in the investments concerned (Stiglitz, 1994).

Economy-wide externalities are particularly prominent in certain key sectors, such as infrastructure, which are characterized by lumpy investments, long gestation lags, higher risks and lower profits. In any economy where private businesses have a predominant role, market signals and private financial institutions can result in the avoidance of these sectors by investors, thereby slowing long-term growth and development. Correcting this kind of market failure provides a role for policymakers in ensuring an adequate flow of credit at favourable costs to frontline technologies and sectors with potentially large social returns (Chandrasekar, 2008). The investment challenge associated with climate change is no different. To accelerate private investment in mitigation, policymakers and public authorities will need to apply incentives through regulatory frameworks, subsidies, guarantees, and financing of the incremental costs of switching technology, among other policy instruments.

Still, large upfront investment costs pose a significant obstacle for many developing countries. The resources committed to date to meet the climate challenge, and the limits of relying on market mechanisms, suggest that the developed countries have yet to take seriously the kind of adjustment that they are expecting from developing countries.

Domestic resource mobilization

According to the logic of a big push, increased public investment creates a matching increased amount of *new* saving, instead of drawing on *existing* saving. At the same time, that higher level of saving creates demand for new financial instruments, including the funding of public sector investments. However, this does not occur automatically and financing gaps have to be filled. Governments must, at the same time, consider how their fiscal space can be expanded and refocused in order to meet their climate objectives without jeopardizing other goals. This is true of developed and developing countries alike, but the challenge is particularly significant in the latter.

In developing countries, on average, the tax revenue collected as a proportion of GDP is only two thirds of the proportion in richer countries, and the larger share is in the form of indirect taxes, as opposed to direct taxes on incomes, profit and capital gains. Tax administration is often weak and subject to evasion and abuse.⁸ In identifying the resources needed to move towards a low-emissions growth pattern, developing countries, in particular, should undertake fiscal reforms that enable a shift away from a reliance on trade, and other indirect taxes, with a view to increasing progressivity and expanding the fiscal space.

On the expenditure side, many Governments are being advised, on climate change-related grounds, to reconsider energy subsidies for low-income households. While the fiscal benefit of removing energy subsidies for low-income households clearly exists,

To accelerate private investment in mitigation, policymakers and public authorities will need to apply incentives through regulatory frameworks, subsidies, guarantees and financing of the incremental costs of switching technology, among other policy instruments

According to the logic of a big push, increased public investment creates a matching increased amount of new saving, instead of drawing on existing saving

⁸ For a further discussion of these issues, see Spiegel (2008) and di John (2007).

both the climate impact and the single-minded focus on this subsidy are questionable. Faced with higher energy prices, low-income households have been known to substitute unpriced energy sources, such as firewood, which has a negative impact on the environment and their own productivity and standard of living.

A vector of subsidies, tariffs and taxes will have to be deployed, of which energy subsidies for the poor should constitute only a part

In the designing of a low-emissions financing strategy, there will have to be deployed a vector of subsidies, tariffs and taxes, of which energy subsidies for the poor should constitute only a part. Simply emphasizing the removal of energy subsidies could undermine equity objectives and thus set back structural transformation and development. On the revenue side, equity considerations will also have to play a key role in generating the needed financing for low-emissions energy investment, and progressive approaches to taxation and fees will need to be a key element in the climate financing strategy.

The issuance of “green bonds” to fund the climate challenge, could be an additional financing tool, along the lines of war bonds, in some emerging economies

A number of developing countries have witnessed the growth of markets for Government bonds in recent years. In light of the financial crisis and the calls for reforming the financial system, issuance of “green bonds” to fund the climate challenge could be an additional financing tool, along the lines of war bonds, in some emerging economies and a safer haven for the rising level of personal savings in a more regulated financial system (see box VI.4 and New Economics Foundation, 2008). Government guarantees and tax breaks could also be used to channel savings into investments that reduce carbon use, including infrastructural investment, as is the case in the United States municipal bonds market.

Box VI.4

Green bonds

The need for capital to finance projects targeted at either mitigation of or adaptation to climate change is immense. Securing finance for investments in such areas which have the inherent characteristics of public goods is less clearcut, however. In particular, given the volume of funds required, as well as the need for sustaining such investments over longer periods of time, relying on public coffers may not be a sufficient or feasible option if this implies either a diversion of expenditure from other items or a significant increase in taxation. An obvious solution is to tap capital markets and to entice members of the private sector into willingly investing their savings in such projects by issuing debt securities that are backed by a larger public entity.

Demand for securities that specifically support low-carbon activities or foster adaptation to climate change is likely to be significant; in contrast to common debt securities, such *green bonds* (also called “climate bonds” or “environment bonds”) could also yield a feel-good dividend generated by the support of environmentally friendly projects. Interest in green bonds appears to be increasing at all levels.

While still small compared with that of the United States of America, the international market for sub-sovereign bond issuances has deepened over the last decade, with greater overall volume, larger issues and longer maturities (Platz, 2009). Several municipalities and cities have already issued green bonds on a small scale and Governments have now sprung on board. For instance, \$2 billion worth of AAA-rated bonds were issued in the United States in 2004 to finance reclaiming of contaminated industrial and commercial land, to encourage energy conservation and to promote use of renewable energy sources. Similarly, a bond issue worth \$530 million was approved in Malaysia in 2006 to finance planting of trees on 375,000 hectares of land.

International institutions have also recognized the merits of green bonds: the European Investment Bank issued *climate awareness bonds* worth more than €1 billion in 2007 to fund renewable energy projects; and the World Bank, in partnership with Skandinaviska Enskilda Banken (SEB) in Sweden, issued green bonds worth \$300 million (SEK 2.325 billion) in 2008.

The idea of offering debt securities that appeal to an investor’s conscience is not a new one: a number of countries issued *war bonds* to finance military operations during the Second World War. Moreover, history shows that such instruments are able to leverage significant amounts of

Box VI.4 (cont'd)

private finance: at the end of the War, *war bonds* had, for instance, been purchased by every second American; they were responsible for the raising of more than \$185 billion at the time, equivalent in inflation-adjusted terms to more than \$2 trillion today. For many countries, including the United States and Germany, municipal bonds have played an important role in financing essential services, in particular water supply systems. Historical experience suggests that certain supply (issuer)-side and demand (investor)-side factors are critical for the development of the sub-sovereign debt market. On the demand side, these factors include the presence of financial intermediaries and investors with suitable long-term portfolio needs, issuer familiarity and confidence with respect to similar securities, the ability to trade debt issuances on secondary markets and low credit and market risk. Supply-side features comprise improved capacity of municipalities to manage and support debt, low issuance costs, suitable regulatory and legal environments and, in some cases, credit enhancements such as guarantees or pooled financing schemes. Thus, in countries that fulfil most of these conditions, green bonds would appear to be a potential source of significant funding for public entities engaged in tackling the global warming challenge.

The scale on which “green” debt instruments can be issued depends in part on the sophistication of domestic financial markets and the overall debt burden of the country. Expansion of a market for such funds is ultimately contingent on the national Government’s ability to raise tax revenues and to set the rate of return on domestic investment. Equity and development considerations are important in respect of relaxing constraints on both. Progressive taxation will ensure greater government revenues as income grows, including from the growing class of bond owners, who are likely to be in upper income brackets. State intervention in establishing rates of return on domestic investment involves capping income from capital in exchange for less risky and less volatile income streams. The capacity of national Governments to influence average domestic returns on investments critically depends on their ability and willingness to manage capital flows. By imposing taxes and restrictions on capital and controlling flows in and out of their borders, Governments will restore their ability to exercise an independent monetary policy, and to influence interest rates in a manner appropriate for stimulating long-term investment.

Public sector development banks provide an alternative funding channel for long-term investment in many developing countries. The record of these institutions in generating long-term financing is uneven, although they have had a particularly important role to play in infrastructure development. Success stories suggest that these banks are most successful when they also encourage the development of complementary private financial institutions, are assiduous in monitoring the recipients of their own funds and avoid excessive public sector risks and badly targeted interest-rate subsidies (United Nations, 2005, pp. 24-25). These institutions have been neglected in recent years in favour of private capital markets and public-private partnerships. However, in the absence of effective regulatory, policy and institutional frameworks, the record of the private sector when it was left with providing the required financing, particularly to essential utilities and services such as energy, has not been a satisfactory one. In many cases, reforming and recapitalizing development banks will be important for a successful transition to low-emission development pathways. Brazil, China and India have gained some experience in using both development banks and special lending windows of commercial banks underwritten by Government guarantees (see box VI.5).

In the absence of effective regulatory, policy and institutional frameworks, the record of the private sector when it was left with providing the required financing, particularly to essential utilities and services such as energy, has not been a satisfactory one

Box VI.5

Developing financial intermediation mechanisms for energy efficiency projects in Brazil, China and India

The potential high returns accruing from energy efficiency projects have been demonstrated; and if the proper delivery mechanisms can be developed, large profit-making investment should become available. However, the sustainable mechanisms that can help overcome many of the barriers inhibiting investment in energy efficiency are still in their infancy and their effectiveness has not been proved. The objective of the Three-Country Energy Efficiency Project (the 3CEE project) was to achieve major increases in energy efficiency investments by the domestic financial sectors in Brazil, China and India by addressing those barriers through a set of activities, and to identify viable financial mechanisms targeting the banking sector and energy service companies in each country. Initiated in November 2002, the project was completed in May 2007.

The activities included technical assistance, training, and applied research covering the following four areas of country interest: development of commercial banking windows for energy efficiency projects; support for energy service companies; guarantee funds for energy efficiency; and equity funding for energy service companies/energy efficiency projects.

Other important project activities included multiple international cross-country exchange workshops and dissemination to allow practitioners from each of the three countries to learn from each other and to tackle jointly the practical problems that each faced in overcoming barriers to increased efficiency investment.

Technical analysis was one of the major activities across various components and significant work was completed in all three countries in this area. In Brazil, venture capital, private equity capital, and shared risk in energy efficiency project work finally led to approval by the Brazilian Development Bank (BNDES) of a new risk-sharing credit line for energy efficiency projects in May 2006, with the participation of several local banks. Support to energy service companies through the project increased their capacity to implement energy efficiency projects through performance contracting. The Energy Sector Management Assistance Programme is providing support for the implementation of the scheme.

In India, new appraisal methodologies and financial structures for energy efficiency projects were developed and training programmes for bankers were conducted. Five of India's banks (the State Bank of India, Canara Bank, Union Bank, the Bank of Baroda and the Bank of India) had launched new schemes for energy efficiency lending by the time the project was completed in 2007.

In China, emphasis was given to developing larger energy efficiency schemes at individual banks which have received strong support from Chinese stakeholders. A large World Bank pipeline project was developed, focusing on promoting the direct bank financing of medium and large-sized energy efficiency projects, whose chief goal is to establish sustainable energy efficiency lending businesses in China's banks. Two of China's domestic banks were selected to act as financial institutions. Capacity-building of energy service companies was carried out through training programmes conducted by the China Energy Management Company Association, the association of energy service companies. The project also catalysed the outreach to local banks and financial stakeholders, supplementing the efforts under the World Bank/Global Environment Facility Energy Conservation II Project guarantee fund in China.

Source: UNEP, Risø Centre.

International financing

International support is indispensable for effective financing of public investment to meet mitigation and adaptation goals

International support is indispensable for effective financing of public investment to meet mitigation and adaptation goals. The urgency of increased support arises against a backdrop of persistent weaknesses in the architecture of development finance at both the bilateral and multilateral levels. The financial mechanisms uniquely designed to manage the climate challenge under the United Nations Framework Convention on Climate Change include a number of grant-based adaptation funds operating under the administrative

auspices of the Global Environment Facility (GEF). These rely on a mixture of voluntary contributions and resources from a 2 per cent levy on transactions under the Clean Development Mechanism. The Global Environment Facility is particularly important because it is able to fund more risky projects and has demonstrated its competence in working in countries that may not attract foreign investors either through the Clean Development Mechanism or directly. Since its inception in 1991, the Facility has allocated more than \$3 billion for projects and has co-financed an additional \$14 billion. A second channel encompasses funds and programmes arising from the loans and grants of bilateral agencies, the largest of which is Japan's Cool Earth Partnership, established in 2008, which aims to allocate \$10 billion in funds over five years. The third channel comprises existing multilateral development institutions, which not only include a variety of mechanisms with a climate-related component but have also set up several specific funds to provide loans, grants and concessional funding, the largest of which are the recently established Climate Investment Funds of the World Bank, a \$6 billion multilateral initiative announced at the July 2008 G8 meeting.

As summarized in table VI.3, this emerging climate architecture is as unnecessarily complex as it is massively underfunded. The array of funds and funding mechanisms lack adequate coordination, leaving many gaps and overlaps. Even though there is still great uncertainty about the level of required transfers for developing countries, there is little doubt that the funding gap is the single largest constraint on progress in climate negotiations. Moreover, even assuming that donor countries met the target of 0.7 per cent of gross national product (GNP) for ODA, and developing countries agreed that the additional resources, of between \$160 billion-\$200 billion, could be used for climate purposes, the funding shortfall from ODA would still be in the order of hundreds of billions of dollars per year (Müller, 2008, p. 7).

The key to any scaling-up exercise resides in finding more predictable multilateral sources of finance. These could come, in part, from the sale of emissions permits or increased carbon taxes in donor countries; more innovative sources of finance, however, will likely be needed. An innovative source of finance framework is a wide-ranging initiative to pilot and implement a variety of new and predictable financing mechanisms and to mobilize countries of widely varying situations for the common purpose of achieving internationally agreed development goals. A hallmark of this approach is global solidarity, with sources of finance coordinated internationally but implemented at a national level. Unlike traditional development financing approaches, which still depend on the political goodwill of rich countries, albeit with a greater emphasis in recent years on "partnerships" in the use of resources, the innovative sources of finance framework entails joint design and decision-making by developing and developed countries for the purpose of raising the resources required to meet a common goal.

The amounts raised to date have not been significant in comparison with ODA flows and so far have been mainly directed at meeting global health objectives. However, a number of proposals raise the possibility of much larger funding possibilities (see box VI.6). Starting with the proposal to use special drawing rights (SDRs) for development purposes, as contained in paragraph 44 of the 2002 Monterrey Consensus of the International Conference on Financing for Development, there have been a wide range of creative ideas emerging. The proposal on special drawing rights already embeds the feature of cooperation on the revenue-raising side of development finance, since all member countries of IMF would have to contribute their currencies under this mechanism.

The emerging climate architecture is as unnecessarily complex as it is massively underfunded

The key to any scaling-up exercise resides in finding more predictable multilateral sources of finance; a hallmark of this approach is global solidarity

Box VI.6

Proposals for mobilizing new, additional and significant financial resources

Between the thirteenth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Bali, Indonesia, from 3 to 15 December 2007, and the fourteenth session of the Conference of the Parties, held in Poznan, Poland, from 1 to 12 December 2008, a number of financing proposals have been advanced by the parties. The major ones are briefly summarized below, along with some others not advanced by the parties themselves. They relate principally to the means of mobilization of financial resources, but some of them also address the issue of the institutional architecture and governance structure of a financing mechanism.

Developing countries emphasize the central role of public finances and the importance of predictability of resource flows. Developed countries generally support the use of existing institutions to channel any additional funds and stress the important role to be played by the private sector in financing through foreign direct investment (FDI) (Santarius and others, 2009). Some of the main alternative proposals for financial resource mobilization are:

- **Enhanced Clean Development Mechanism (offsetting).** The deficiencies of the Clean Development Mechanism at present for facilitating large-scale resource transfers are widely acknowledged. Much attention has been focused on reforming the Clean Development Mechanism so as to replace its project focus with a programmatic and/or policy focus, with the expectation of larger impacts, shorter funding cycles and lower transaction costs. The United Nations Framework Convention on Climate Change secretariat estimates that, by 2020, offsetting could yield up to \$40.8 billion per year, still only a fraction of estimated incremental costs in developing countries
- **Compulsory leveraged offsetting.** One proposal (Pendleton and Retallack, 2009) suggests that the Annex I emissions to be covered by developing-country Clean Development Mechanism projects should be offset not ton for ton but in a ratio, for example, of 2:1 or higher.^a Thus, a developed-country emitter wishing to use the Clean Development Mechanism to cover one ton of its own unmitigated emissions would need to invest in two or more tons of emission reductions in developing countries. This proposal has the virtue of simplicity, essentially utilizing the existing Clean Development Mechanism framework but applying a compulsory leverage ratio to the Mechanism's transactions. Also, depending on the leverage ratio chosen, the proposal could generate significant financial transfers. Thus, an Annex I reduction target of 40 per cent below 1990 levels by 2020 and a 2:1 leverage ratio could generate \$130 billion per year in Clean Development Mechanism financing
- **Mandatory assessment.** The Group of 77 and China have proposed that Annex I parties contribute from 0.5 to 1.0 per cent of their gross national income to climate change financing in non-Annex I countries, to be channelled through a multilateral climate technology fund under the authority of the United Nations Framework Convention on Climate Change. This would generate approximately \$150 billion-\$300 billion per year at pre-crisis income levels of major Organization for Economic Cooperation and Development (OECD) economies
- **Assessed contributions based on the criterion of fairness and the polluter pays principle.** Mexico has proposed the creation of a multilateral climate change fund, to which all countries would contribute, on the basis of greenhouse gas emissions,

^a The American Clean Energy and Security Act of 2009 contains a provision of this sort, whereby a ton of domestic CO₂ emissions could be offset against only four fifths of a ton of developing-country emissions. This means that to cover the full ton, a United States emitter would need to buy 1.25 tons of credit from the Clean Development Mechanism, representing a leverage of 1.25:1.

Box VI.6 (cont'd)

population and gross domestic product, in accordance with the principle of common but differentiated responsibilities and respective capabilities. The fund would be used to finance both mitigation and adaptation

- **Revenue from a global auction of a portion of assigned amount units (AAUs).** Norway has proposed withholding 2 per cent of permits from national quota allocations (assigned amount units (AAUs)) of all parties and auctioning them directly, or raising revenue through a tax on the issuance of assigned amount units. The portion to be auctioned could be adjusted to achieve a revenue target. By Norway's estimate, given recent carbon market prices and price expectations, a 2 per cent auction could generate revenues of \$15 billion-\$25 billion per year
- **Crediting nationally appropriate mitigation actions (NAMAs).** The Republic of Korea has proposed a system of credits for nationally appropriate mitigation actions, so that developing countries could borrow against anticipated future carbon credit sales in order to finance early action. Crediting nationally appropriate mitigation actions would help finance already planned low-carbon strategies in developing countries (Pendleton and Retallack, 2009)
- **Global carbon levy.** Switzerland has proposed a \$2 per ton global carbon dioxide levy on all fossil fuel emissions, with exemptions for least developed countries, with a portion of revenues allocated to a multilateral adaptation fund and another portion channelled into each country's national climate change fund. The estimated revenue raised would be \$48.5 billion, dependent on the price of fossil fuels. The incidence of such a levy needs to be carefully considered, as it could well be regressive
- **Other levy-based proposals.** Brazil has advanced a proposal with some similarity to Switzerland's, with a 10 per cent petroleum and coal tax used to finance a global fund to be used for technology transfer, adaptation and compensation for forest preservation. Such a tax, at current prices, would generate an estimated \$130 billion in revenue. The least developed countries have proposed an international levy on aviation to the tune of \$4 billion-\$10 billion and a levy on bunker fuels for shipping and aviation to the tune of \$4 billion-15 billion (Pendleton and Redallack, 2009)
- **Unrelated levies.** Various proposals have been made for raising revenues for climate change action from sources not closely linked to greenhouse gas emissions, for example, financial transactions, assets in tax havens, etc. These proposals are marred by what is perceived to be the arbitrariness of their choice of source and by the fact that the worthy competing causes that could benefit from such financing are indeed numerous.

Subsequent proposals have explored the possibility of using special drawing rights for development financing as well as liquidity provisioning (Aryeetey, 2003; Soros, 2002). International levies collected on air travel or financial transactions also overcome the traditional dependence of multilateral resources on the outcomes of political processes in the donor countries. One mechanism already being discussed within this framework is the currency transaction tax, which could raise at least \$50 billion per year at a rate of 0.5 per cent; a tax on carbon market transactions has also been considered as a possible source of multilateral finance.

Towards a global investment regime to address the climate challenge

While market-based approaches will need to be part of the solution, as argued throughout this *Survey*, the key focus of a wider approach should be on meeting the major investment challenge of simultaneously addressing climate change, sustainability and economic development. Without significant financial transfers from wealthy countries, any expectation that poorer countries will move onto a low-emissions growth path is almost certain to be disappointed.

This investment-led approach seeks to bring about a change in the development trajectory so as to meet the growth and development goals of developing countries consistent with reducing their carbon dependence. At the national level, and as part of a long-term industrial development strategy, public investment in mitigation and adaptation activities needs to be scaled up. Energy provision is a central component of this strategy but it is interlinked with transportation, water security and economic diversification (chaps. II and III). Industrial policy—understood not only as targeting and coordinating specific sectoral support measures undertaken by Governments, but also as entailing the socialization of investment risks, the removal of barriers to adopting otherwise profitable technologies and support for technological learning and upgrading—has a key role to play both domestically (chap. IV) and internationally (chap. V). A successful investment push along these lines would in turn increase productivity and reduce the costs of using new technologies, thereby opening up further investment opportunities.

In comparison with market-based mechanisms which would likely be accompanied by adjustments, a globally funded public investment programme would promote equity by enabling the developing world to sustain catch-up growth through the mobilization of resources domestically, while making significant cuts in emissions (chap. I). Such an investment programme would utilize market mechanisms insofar as government policy provided clear and unequivocal signals to private enterprises about the next wave of investment opportunities, without being based on a single price-based intervention.

Efforts to develop an investment programme that combines development and environmental goals on the scale that has been discussed in the present *Survey* have been few and far between. This, of course, is why we are now facing the challenge before us. However, the establishment by Brazil of a sugar cane-based ethanol energy and transport system is one recent example of the success of such efforts, even more telling since it has been achieved by a developing country. A historical example concerns an underappreciated component of New Deal policies in the United States of the 1930s, namely, the Tennessee Valley Authority (see chap. IV, box IV.1). With support at the federal level from the Rural Electrification Administration and the Reconstruction Finance Corporation, the Authority combined development, energy and environmental objectives into a concerted and coordinated effort to transform the economic potential of the Southern States by lowering transport costs, reducing the risk of flooding and creating a low-cost source of power that not only directly raised living standards but also helped the region crowd in substantial private investment and create new jobs. The big difference this time around is that the new investment deal that is needed to meet the climate challenge must be recognized as a truly global project.

A globally funded public investment programme would promote equity by enabling the developing world to sustain catch-up growth through the mobilization of resources domestically, while making significant cuts in emissions

Elements of a global programme

The review of available estimates of mitigation and adaptation costs suggests that additional annual total investments in developing countries could be upwards of one trillion dollars per year. The breakdown between the public and private sector will no doubt vary considerably across time and among countries. However, according to the suggested scenario in part B of figure VI.1, the initial push would be strongly biased towards the public sector and marked by the need to front-load much of the required investment in the early stages of a new development path. It seems likely, as a consequence, that even the highest estimates underestimate the scale of the immediate challenge facing many developing countries if they are to establish a new low-emissions, high-growth development pathway.

The present *Survey* does not attempt a detailed breakdown of the big push but, as highlighted in the preceding sections, it is clear that there needs to be a radical shift in the existing system of funding for mitigation and adaptation efforts. A central message is that, to bring about changes, a mix of financing mechanisms will be needed—a mix that will vary across countries and over time. In the present section, we focus on the public investment aspect of the pathway in developing countries.

A global approach to a publicly funded investment programme is based on three elements:

- A development accord that recognizes equity as an integral part of a global response to climate change
- Additional and substantially scaled-up financing to allow for climate action with greater urgency: the case for a big push
- Independent and participatory governance structures along the lines of the Marshall Plan.

A development accord

Equity is an essential ingredient of an effective global climate change policy, as reflected in the principle of “common but differentiated responsibilities and respective capabilities”, as set forth in paragraph 1, article 3, of the United Nations Framework Convention on Climate Change. Not only have today’s high-income economies generated about 80 per cent of past fossil fuel-based emissions, but those same emissions have helped carry them to high levels of social and economic well-being. These countries carry the responsibility for the bulk of climate damage but they also have the capacity to repair it (Müller, 2008). However, from a long-term perspective, limiting further damage also requires that developing countries shift their energy and land use and their consumption needs towards low-emissions options.

Compelling developing countries to cut emissions at this stage of their development constitutes an inappropriate—and unworkable—approach to facilitating progress. Such an approach would almost certainly freeze a pattern of income inequality that already exhibits intolerable income gaps within and, in particular, across countries. Catch-up growth and convergence remain fundamental policy priorities. Reconciling this with climate objectives can be achieved only if the investments needed to drive growth assume a technological profile different from the one that drove the historically unprecedented growth performance of today’s advanced economies.

There needs to be a radical shift in the existing system of funding for mitigation and adaptation efforts

Equity is an essential ingredient of an effective global climate change policy

It is important to acknowledge that developing countries have already begun to take significant steps towards developing energy efficiency and cleaner energy sources and building multilateral support to finance further emissions reductions at an accelerated pace (Pendleton and Retallack, 2009). However, much higher initial investment costs will need to be incurred if the adjustment to a low-emissions economy is to take place at a faster pace and on the requisite scale to meet climate goals while at the same time ensuring the achievement of development goals.

This will require additional multilateral financing, on an adequate and predictable scale, comprising grants, concessional loans and compensatory payments. In the context of the ongoing United Nations Framework Convention on Climate Change negotiations, developing countries have insisted on the fact that article 4, paragraph 3, of the Framework Convention implies that Annex II countries have a clear-cut responsibility for providing new and additional financial resources to meet the agreed full costs incurred by developing-country parties in complying with their obligations. Translating such responsibilities into tangible resources is still a major stumbling block, depending on how much weight is given to responsibility and capability. Placing this challenge in the context of an evolving investment programme is to recognize that developing countries will themselves be responsible for mobilizing resources on an increasing scale over time, as well as for insisting on the responsibility of developed countries for meeting the additional costs of undertaking such investments in the initial stages of the transition.

Additional and substantially scaled-up financing

The existing ODA model is not up to the task of funding the climate challenge

In light of previous discussions, it becomes clear that the existing ODA model is not up to the task of funding the climate challenge. More substantial and more predictable forms of financing will most certainly have to be found and new mechanisms of resource mobilization will have to be considered, such as those suggested in box VI.6.

Yet, the obvious starting point for the scaling up resources would be to insist that advanced countries meet their existing commitment to a target a 0.7 per cent of GNP for ODA. Developing countries have rightly expressed both their reservations about treating climate commitments simply as aid and their concerns, also justified, that additional expenditures linked to climate change could “crowd out” assistance for development goals. However, climate vulnerability is closely linked to interlocking stresses related to other development challenges which in turn reinforce climatic vulnerabilities (chap. III). These close links between adaptation and development should provide extensive scope for synergies if developed countries remain faithful to their ODA commitments (Levina, 2007). It will be imperative, however, to recognize that financing for adaptation is not aid as such but is much closer to a form of compensation paid by high-emitting countries for the damage they are inflicting. There is no shortage of institutions available to channel such funding. However, new funding mechanisms may still be needed, in the area, for example, of disaster management (United Nations, 2008). The bigger challenge is likely to be one of coordinating the required expansion of ODA, ensuring consistency across funding sources, and reducing duplication and waste. This may require the establishment of a central agency to collect international adaptation funding and to provide some degree of coherence across programmes (Müller, 2008).

The “bilateralization” of multilateral aid should be minimized by imposing coordination between funds and integrating resources

That said, criticisms of the governance of the aid architecture will need to be urgently addressed as funding is scaled up. In the first place, the lack of transparency in the donor-dependent approach to the design of specific-purpose funds, as is particularly apparent with respect to the current pattern of adaptation funding, will need to be cor-

rected. International cooperation should assist the integration of mitigation and adaptation in the national policies of developing countries under the “country-led and country-owned” principle. Second, there will be an urgent need to rationalize and minimize proliferation of funding mechanisms. There has been a proliferation of specific funds administered by bilateral agencies, which differ widely in terms of purposes, amount mobilized, time-horizons and mechanisms for channelling resources to developing countries. The “bilateralization” of multilateral aid should be minimized by imposing coordination between funds and integrating resources; for example, funding for reducing emissions from deforestation and forest degradation could expand by combining resources and approaches from different institutions (such as the forestry funds of Norway and Australia, and the Amazon Fund).

That the capacity to scale up multilateral financing exists has been revealed by the financial crisis and this bodes well for climate financing. However, with the attention of the international community focused on the deepening global economic crisis, there is the danger that efforts to finance an effective response to climate change will be delayed. Delaying investments in a new energy, transportation and health infrastructure, bolstering the productivity of the rural economy and making it less susceptible to climatic shocks, is as unnecessary as it is self-defeating (Stern and Kuroda, 2009). Making up for the loss of private demand from the ongoing economic crisis will require vigorous counter-cyclical fiscal policies for which a truly global coordinated response is appropriate (United Nations, 2009). In this context, increased public investment to meet climate as well as development objectives will bring short-term benefits through a demand impulse while aiding the transition towards low-emissions economies.

However, developing countries are concerned that a dominant role for existing multilateral institutions in future climate-related financing will perpetuate the unsatisfactory practices associated with past development finance. The kinds of conditionalities attached to that financing are seen as particularly unacceptable given that climate finance, even more than development finance, is required to make adjustments to the past actions of richer countries. Moreover, developing countries insist that decision-making should be based on the one-country, one-vote principle (as under the framework of the United Nations Framework Convention on Climate Change) and not on the amount of money contributed, as is still the case in the international financial institutions. In these respects, many of the recently established climate funds appear to represent, on one recent assessment, “a distinct step back from the GEF compromise” and “are almost certain to create a new level of North-South political discord over the funding for global environmental action at a historical juncture, when the world can ill afford it” (Porter and others, 2008, p. 47).

As suggested earlier, the initial responsibility for ensuring adequate multilateral funding lies with Annex II countries. Using the Greenhouse Development Rights (GDR) methodology discussed in chapter I, a possible breakdown of their contribution is given in table VI.4. For every 100 billion dollars of climate financing, EU would contribute 32.9 billion, the United States 47.7 billion and Japan 11.2 billion. The Commission of Experts of the President of the General Assembly (the Stiglitz Commission) (United Nations, 2009) has recently proposed that industrialized countries dedicate 1 per cent of their national stimulus packages, in addition to traditional ODA commitments, to help address the strains imposed by the global economic downturn on the poorest citizens. In respect of the OECD countries, the average weighted stimulus package will account for about the 3.4 per cent of GDP over the period 2008-2010 (Organization for Economic Cooperation and Development, 2009). That would generate additional ODA of over 1.3 billion dollars over two years. As such, this represents a symbolic acceptance of the global nature of the challenge.

The initial responsibility for ensuring adequate multilateral funding lies with Annex II countries

Table VI.4.
Possible breakdown of climate-related ODA flows for Annex II countries to 2020

	Population (percentage of world total)	GDP per capita (United States dollars purchasing power parity)	Climate-related ODA (percentage of flows)	Share of ODA by Annex II countries as of 2008 (percentage)
EU-15 ^a	5.80	33 754	32.9	28.3
of which:				
Germany	1.20	34 812	7.8	11.6
United Kingdom	0.90	34 953	5.3	9.5
France	0.91	33 953	4.6	9.1
United States	4.50	45 640	47.7	21.7
Japan	1.90	33 422	11.2	7.8
Others	1.00	38 149	8.2	11.9
Total Annex II countries	13.20	30 924	100.0	100.0

Source: Pendleton and Retallack (2009).

^a The 12 accession countries of the European Union (EU) are not listed in Annex II but are probably exposed to article 4.3 obligations as a result of their EU membership. However, because of their relatively marginal impact on the big picture as presented in this table, they are not included in the calculation.

The steady increase in the finance, on a scale that is commensurate with the projected scale of public investment that is required in order to shift to a low-emissions development pathway will need new international funding instruments of the kind suggested earlier. These will have to be considered in an open and dispassionate manner if real and timely progress is to be made.

Independent and participatory governance structures

Donor Governments seem to have opted for a disjointed approach which encourages fragmentation of the global response to climate change, to the great detriment of efforts to achieve effectiveness, efficiency and equity

At a time when the international community needs to bring together myriad elements, mechanisms and agreements into a strategic framework, donor Governments seem to have opted for a disjointed approach which encourages fragmentation of the global response to climate change, to the great detriment of efforts to achieve effectiveness, efficiency and equity. A global investment programme aimed at effectuating the shift to low-emissions, high-growth development pathways requires a governance structure that is able to pursue a much more focused and coherent agenda, prevents dominance by donor countries and provides for participatory decision-making on financial contributions and disbursements. Stern (2009, pp. 200-202) has recently argued, on these grounds, that the climate challenge probably needs a new institutional architecture.

Certainly, in dealing with the large scale of the financial transfers required for mitigation and adaptation in developing countries, there is a clear need for an enhanced financial mechanism, building on article 11 of the United Nations Framework Convention on Climate Change. As a minimum, against the backdrop of the proliferation of multilateral and bilateral financing mechanisms, such a body is needed for measuring, reporting and verifying financial flows from a variety of developed-country sources and for ensuring that greater coherence in the emerging system of climate financing is achieved (Pendleton and Retallack, 2009).

The bigger question concerns the management and allocation of financial resources. It is often argued that the World Bank and other multilateral development banks might be better positioned to scale up financing than a fund under the authority of the United Nations Framework Convention on Climate Change. However, these institutions have major limitations in the context of global environmental finance (Porter and others, 2008). For instance, the newly established Climate Investment Funds that are administered by the World Bank have been criticized not only for their governance structure, which replicates the existing asymmetries of the Executive Board of the World Bank, but also for undermining the United Nations Framework Convention on Climate Change and for not being truly additional to existing ODA commitments (Tan, 2008). Indeed, on their own assessment, multilateral development banks still do not seem to be systematically factoring climate change into their investment choices and need to do more to ensure that all of their investments and lending operations take climate change into account (World Bank, 2008b; Ballesteros, 2008). Moreover, the bias in the lending activities of multilateral development banks since the mid-1990s raises questions about the suitability of these institutions for administering a publicly led global investment programme. The largest decline in World Bank lending for infrastructure projects since the mid-1990s has occurred in the electricity sector, triggered by the expectation that the private sector would take up the slack (Platz and Schroeder, 2007). While the direction of the trend has been reversed since 2002, new commitments on average have not yet reached the levels of the mid-1990s.

Developing countries have also pointed out that additional financing, even on concessionary terms, to help them switch to cleaner energy sources will likely mean their acquiring additional debt to address a problem to which they contributed relatively little. This raises long-standing concerns for many developing countries about the role of development finance, including the privileged position of creditors in international financial negotiations, and the use of adjustment lending, through attached conditionalities, to shape their policy options across a broad range of economic and social issues. They are concerned that housing any new financing mechanisms in the international financial institutions would subject them to the same governance arrangements and conditionalities as were imposed on previous loans from these institutions. The Group of 77 and China have expressed their preference for a global fund to be governed, not by the international financial institutions or the Global Environmental Facility,⁹ but by the Parties to the United Nations Framework Convention on Climate Change, following the model of the Multilateral Fund for the Implementation of the Montreal Protocol and of the Adaptation Fund under the Kyoto Protocol. On the other hand, a number of Annex I countries have reservations about following the Montreal Protocol model for climate change financing.

Entrusting a Conference of the Parties-accountable body with the mandate for a global investment programme could be an important first step towards the development of a broader institutional structure on global climate change financing. However, such a response could introduce the danger of locking new financing into an environmental project-based approach, which would run counter to the arguments presented in this chapter.

Entrusting a Conference of the Parties-accountable body with the mandate for a global investment programme could be an important first step towards the development of a broader institutional structure on global climate change financing

⁹ The Global Environment Facility has indicated its intention to review and reshape its governance structure in response to developing-country concerns over representation.

Living up to the challenge: lessons from the Marshall Plan

The right model for meeting shared global challenges is the Marshall Plan

Whatever the institutional details finally agreed to, the right model for meeting shared global challenges is still the Marshall Plan, as also noted by Al Gore in his Nobel Lecture in 2007. On many counts, the scale and urgency of the climate and development challenges need an integrated emergency response of the kind that informed the Marshall Plan. Moreover, part of the success of the Plan was due to the fact that it bypassed the fledgling Bretton Woods institutions which had not appeared to be up to the job of fashioning policies and supporting institutional reforms attuned to local conditions. Many might see this as the principal lesson to be applied to the current challenge.

However, as noted in the *World Economic and Social Survey 2008* (United Nations, 2008), the Marshall Plan is not a blueprint which can simply be rolled out to meet contemporary challenges. Rather, it encompasses a set of broad principles which can be tailored to contemporary challenges and sensitivities.

Despite the demonstrated success of the Marshall Plan framework in Europe in the 1940s, “aid” has developed over the years into a mixture of assistance for an assortment of specific projects and ad hoc responses to unexpected shocks with little apparent coherence, in respect either of the countries that receive it or of its global distribution. Donor conferences are driven more by what donors want to promote than by the desire to support specific multi-year national programmes. It is difficult to see how aid can ever be really effective without an articulation of macroeconomic objectives and detailed programmes for infrastructure investment, etc., and without a coherent account of priorities—what should be done and in what order—and a sense of the necessary complementarities among different investments and projects.

National development programmes along the lines of the Marshall Plan would make it easier to provide general, non-project assistance to Government budgets or for financing the balance of payments, as was the case for a number of European countries under Marshall Aid. The structural changes implied by the shift to a low-emissions development pathway will surely bring with them fiscal and current-account pressures even as long-run adjustments are realized. The need to provide financial assistance to deal with long-term imbalances is usually seen by the international financial institutions as evidence of a weak commitment to reform and as encouraging a slackening of discipline by postponing necessary adjustment. This was not the view of the Marshall Planners, who regarded such assistance as an investment in structural change and as providing Governments with the breathing space required to ensure the success of difficult and often painful policies. Nor can it be the view if the climate and development challenges are to be met.

Another major attraction of a Marshall Plan framework is that it can serve an important political function. A multi-year programme for achieving economic and environmental objectives, setting out their interrelationships, the means to achieve them and their dependence on outside assistance, effectively embodies a Government’s vision of the kind of societal structure at which it is aiming. Obviously of a highly political nature, the proposed programme provides the basis for democratic discussion and for the kind of negotiations among competing views that should take place. The task is not an easy one, as is shown by the history of indicative planning in France (Cohen, 1977), but obtaining popular support for such a programme can be a major stimulus for change. This will not always result in what the international financial institutions regard as the “best” policies, but the advantage of democratic processes is that they generate pressures to correct mistakes.

National development programmes along the lines of the Marshall Plan would make it easier to provide general, non-project assistance to Government budgets or for financing the balance of payments

The creation of a “new Marshall Plan” could thus be the means of providing a concrete operational basis for such ideas as “ownership” and “partnership”, which otherwise risk degenerating into empty slogans. Moreover, a coherent national programme bolstered by popular support, indicating where outside assistance could be most effective, ipso facto becomes a powerful vehicle for persuading potential donors to respond to national priorities instead of following their own preferences with regard to what might be available in a basket of seemingly unrelated projects.

Conclusion

In terms of the need to secure international cooperation, the climate financing challenge is substantial and daunting. It is clear that, while market-based and voluntary approaches will have an important role to play over time, they are inadequate for meeting the immediate financing requirements. The shift to a low-emissions, high-growth development pathway in the developing world is unlikely to be led by private sector investment and risk-taking. Thus, more binding modalities of international cooperation must be pursued at the same time that countries are dealing with the financial crisis. The same limitations that dog international cooperation in respect of financing development apply to the response to climate change. In the face of this predicament, it is important to realize, however, that the international community can overcome the two sets of limitations simultaneously by recognizing that a global investment programme directed towards climate change objectives represents a key intervention in favour of development.