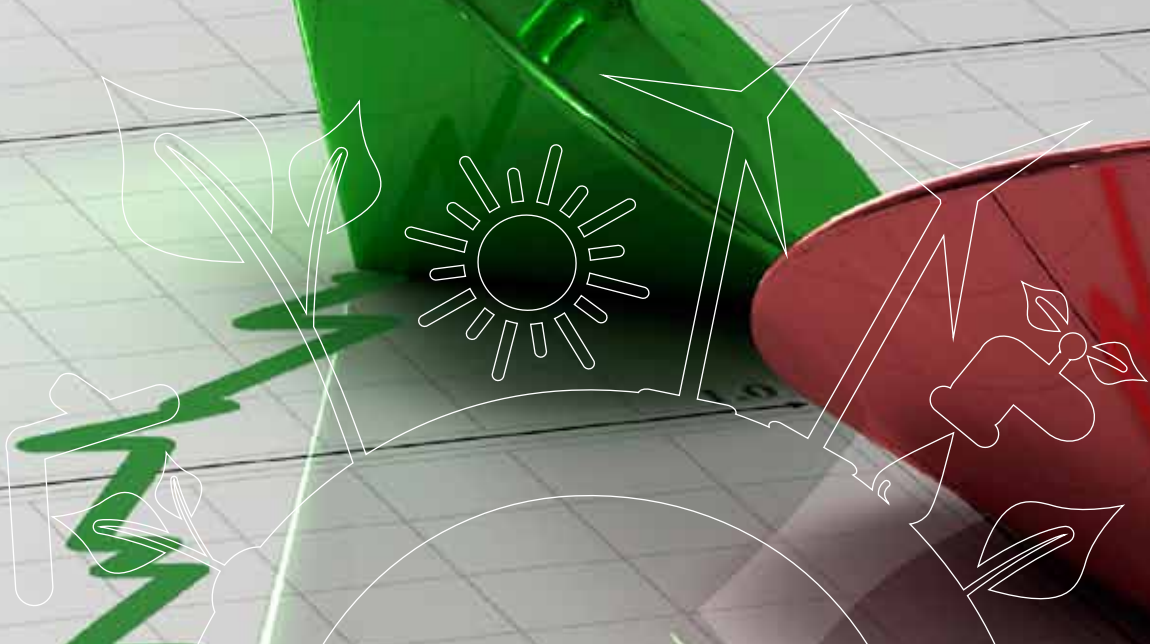




GREEN ^{growth}economy



Finance

Supporting the transition to a global green economy



Acknowledgements

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The chapter was developed by a task force under the direction of Paul Clements-Hunt. Marenglen Gjonaj (Programme Officer – UNEP FI) managed the chapter, including the handling of peer reviews, conducting supplementary research and bringing the chapter to final production. Sheng Fulai conducted editing on an earlier draft of the chapter. During the development of the chapter, invaluable advice was received from UNEP FI Advisory Council on Green Economy consisting of Barbara Krumsiek (President, CEO and Chair of Calvert Group, Ltd. Director and Chair of Acacia Life Insurance Company); Matthew J. Kiernan (Inflection Point Capital Management); Richard Burrett (Partner, Earth Capital Partners LLP); Jonathan Maxwell (CEO, Sustainable Development Capital Partners LLP); Paul Hilton (Director of Sustainable Investment Business Strategy, Calvert Investments); Raj Singh (Chief Risk Officer, Swiss Reinsurance Company); Andreas Spiegel (Vice President, Risk Management, Swiss Reinsurance Company); Sergio Rosa (President, PREVI); Rafael Castro (Strategic Planning Manager, PREVI); Masahiro Kato (Head of SRI, Mitsubishi UFJ Trust and Banking Corporation); Thomas Loster (Chair, Munich Re Foundation)

The chapter also benefited from advice and specific inputs received from Remco Fischer (Programme Officer – Climate change); Paul McNamara (Director: Head of Research, PRUPIM);

Butch Bacani (Programme Officer – Investment /Insurance); Valborg Lie (Special Adviser, Norwegian Government Pension Fund); Ivo Mulder (Programme Officer – Biodiversity / Water & Finance); Derek Eaton (Economic Affairs Officer, UNEP Economics & Trade Branch); Dan Siddy (Director, Delsus Limited); Andrew Dlugolecki (Andlug Consulting); Cornis Van Der Lugt (Coordinator: Resource Efficiency, UNEP); Blaise Debordes (Head of Department for Sustainable Development, Caisse des Dépôts et Consignations); Murray Ward (Principal, Global Climate Change Consultancy); Anton van Elteren (FMO); Marijn Wiersma (FMO)

We would like to thank the many colleagues and individuals who provided contribution to this chapter and reviewed earlier drafts including, Eric Usher (UNEP); Angelo Calvello (Journal of Environmental Investing); Herman Mulder (Independent advisor and Advisory Board TEEB a.o.); Takeyiro Sueyoshi (Special Advisor to FI in Asia-Pacific region); Nick Robins (Head, HSBC Climate Change Centre) Paul Watchman (Chief Executive, Quayle Watchman Consulting); Steve Waygood (Head of Sustainability research and Engagement SRI, Aviva Investors); Paul Watchman (Chief Executive, Quayle Watchman Consulting); Julie Fox Gorte (Senior Vice President: Sustainable Investing, PaxWorld Management LLC); Mark Eckstein (Managing Director, International Finance, WWF); Michele Chan (Economic Policy Project Director, Friends of the Earth); Gerhard Coetzee (Head Microenterprise Finance Unit, Absa); and Miroslaw Izienicki (President & CEO, Fifth Capital Group).

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List of acronyms

A/R	Afforestation and Reforestation	MFIs	Microfinance Institutions
ADB	Asian Development Bank	NAMAs	Nationally Appropriate Mitigation Measures
AUM	Assets under management	ODA	Official Development Assistance
BAU	Business-as-usual	OECD	Organisation for Economic Co-operation and Development
BCBS	The Basel Committee on Banking Supervision	PE	Private equity
BES	Biodiversity and Ecosystem	PFMs	Public Financing Mechanism
BIS	The Bank for International Settlement	PRI	United Nations-backed Principles for Responsible Investment
CCX	Chicago Climate Exchange	R&D	Research and Development
CDM	Clean Development Mechanisms	REDD	Reducing Emissions from Deforestation and Forest Degradation
CERC	Search Results Central Electricity Regulatory Commission	REN21	Renewable Energy Policy Network for the 21st Century
COP	Conference of Parties	RICS	The Royal Institution of Chartered Surveyors
DFI	Development Finance Institutions	SWFs	Sovereign wealth funds
EBRD	European Bank for Reconstruction and Development	TEEB	The Economics of Ecosystems and Biodiversity
EIB	European Investment Bank	UNDP	United Nations Development Programme
ESG	Environmental, Social and Governance	UNEP FI	United Nations Environment Programme Finance Initiative
EU ETS	EU Emissions Trading System	UNEP SBCI	United Nations Environment Programme Sustainable Buildings and Climate Initiative UNEP
FDI	Foreign Direct Investment	SEFI	United Nations Environment Programme Sustainable Energy Finance Initiative
FMO	The Netherlands Development Finance Company	UNFCCC	United Nations Framework Convention on Climate Change
FSB	Financial Stability Board	UOT	Universal Ownership Theory
G20	Group of Twenty	US SEC	U.S. Securities and Exchange Commission
GEF	Global Environment Facility	VC	Venture capital
GDP	Gross Domestic Product	WBCSD	The World Business Council for Sustainable Development
GHG	Greenhouse gas	WEF	World Economic Forum
GIB	Green Investment Bank	WFE	World Federation of Exchanges
GRI	Global Reporting Initiative	WRI	World Resource Institute
IEA	International Energy Agency	WWF	World Wide Fund for Nature
IFC	International Finance Corporation		
IFLS	International Financial Services London		
IIRC	International Integrated Reporting Committee		
IMF	International Monetary Fund		
IPCC	Intergovernmental Panel on Climate Change		
KfW	German Development Bank		
KP	Kyoto Protocol		
MDGs	Millennium Development Goals		

Key messages

1. A global green economy transformation will require substantial financial resources.

Indicative figures such as those from the International Energy Agency's (IEA) scenarios for halving worldwide energy-related CO₂ emissions by 2050 and on modelling, in this report, show additional investments required will likely be in the range of 1 to 2.5 per cent of global Gross Domestic Product (GDP) per year from 2010 to 2050. A considerable amount of investment will be needed in energy supply and efficiency, particularly in greening the transport and buildings sectors.

2. Financial investment, banking and insurance are the major channels of private financing for a green economy.

The financial services and investment sectors control trillions of dollars that could potentially be directed towards a green economy. More importantly, long-term public and private institutional investors, banks and insurance companies are increasingly interested in acquiring portfolios that minimise environmental, social and governance risks, while capitalising on emerging green technologies. Microfinance has a potentially important role at the community and village level to enable the poor to invest in resource and energy efficiency as well as increase their resiliency to risk.

3. Opportunities exist to meet the financing needs of a green economy. The rapid growth and increasingly green orientation of capital markets, the evolution of emerging market instruments such as carbon finance and microfinance, and the green stimulus funds established in response to the economic slowdown of recent years, are opening up space for large-scale financing for a global green economic transformation. But these flows are still small compared to investment needs and must be scaled up quickly if the transition to a green economy is to jump-start in the near term. Concentrated pools of assets, such as those controlled by pension systems and insurance companies, the US\$ 39 trillion-plus controlled by the high net worth community and the growing assets of sovereign wealth funds will need to support the green economy in coming decades.

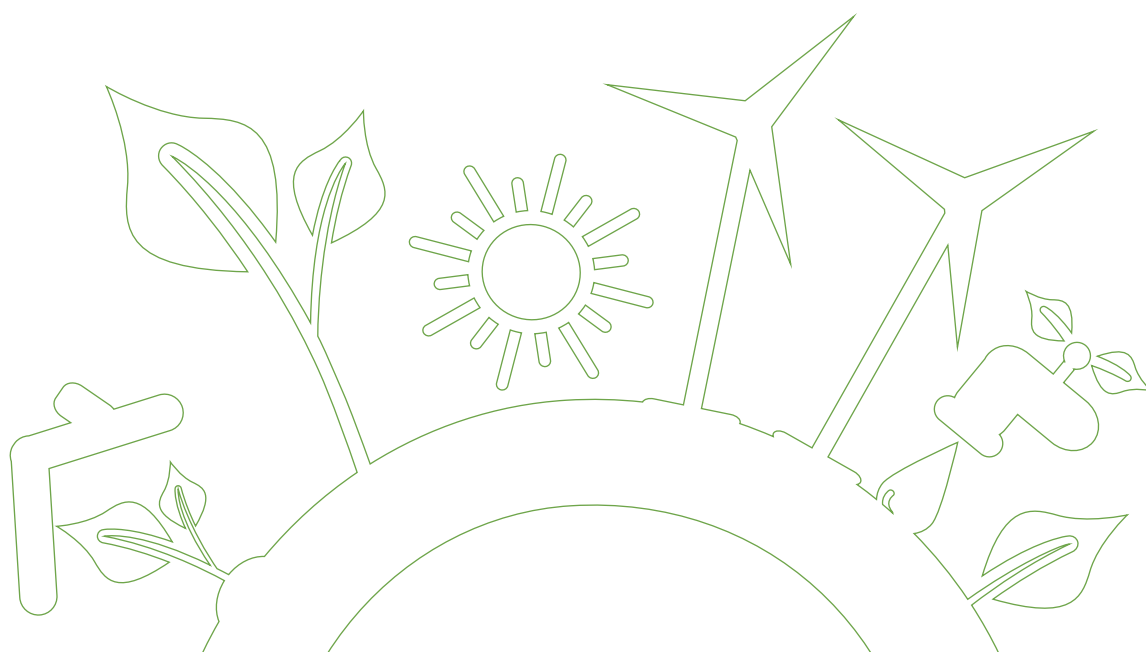
4. Advances in disclosure and sustainability reporting are increasing transparency and driving change.

In 2009, the global market size for institutional assets was estimated at just over US\$ 121 trillion. Of the actively managed components of these assets, controlled by a broad range of large institutional investors, some 7 per cent was subject to the integration of environmental, social

and governance (ESG) considerations. Considering the environmental costs attributable to business and human activity – estimated at more than US\$ 6 trillion in 2008 – much more transparency is needed. Scaling up resources for investment adhering to ESG principles is urgent and will require innovation and leadership by business and industry, collective action and public-private approaches as well as supportive regulatory frameworks.

5. The role of the public sector is indispensable in freeing up the flow of private finance towards a green economy. Governments should involve the private sector in establishing clear, stable and coherent policy and regulatory frameworks to facilitate the integration of ESG issues into financial and investment decisions. In addition, governments and multilateral financial institutions should use their own resources to leverage financial flows from the private sector and direct them towards green economic opportunities.

6. Public finance is important for triggering a green economic transformation, even if public resources are significantly smaller than those of private markets. The role of public development finance institutions (DFIs) in developed and developing countries in supporting the transition to a green economy could be strengthened further. Development Finance Institutions can adopt the goal of supporting development of the green economy, allocate significant proportions of their new lending towards financing green economy transition projects and link it to specific targets such as reduction in greenhouse gas (GHG) emissions, access to water and sanitation, biodiversity promotion and poverty alleviation. Policies can be designed to improve the “green efficiency” of their portfolios, for example, by examining the carbon and ecological footprints of their investment portfolios. In addition, DFIs can jointly define protocols for green due diligence, as well as standards and goals for sectors in which they have a major influence, such as transport, energy and municipal finance.



1 Introduction

1.1 Scope of this chapter

The earlier chapters of this report have highlighted how the successful emergence of a green economy is critically dependent on new approaches to finance and investment. Innovation is needed to consistently deliver dramatically higher volumes of annual investment in key segments of the green economy market. The vast majority of this investment will need to come from the private financial sector, supported by the enabling actions of farsighted policy makers, as well as the catalytic role of development finance institutions (DFIs) and supranational bodies such as the United Nations.

The quality of this investment – such as tenor and risk/return requirements – is arguably just as important as the quantity. As a result, many other interrelated issues need to be considered. For example, partnership is needed to support pre-investment market development and formulate cost-effective policy-based incentives that facilitate private sector investment in the green economy. International accounting practices need to evolve to incorporate environmental externalities. New

instruments need to be developed for risk-sharing and financial intermediation. These new instruments could enable more private investors – ranging from individual savers to large pension funds representing thousands of people – to participate in financing the transition to a green economy.

This chapter examines how the green economy is currently being financed and explores the priorities and potential methods for increasing this investment. The chapter seeks to make the case for scaling up financing available for the transition to a green economy and amplifying the financial sector's role as an agent of change.

The analysis emphasises investing, lending by banks, and insuring - focused primarily on private sector sources of finance. In addition, reference is made to the enabling and complementary role of governments, DFIs and other non-private sector entities. There is already significant momentum in this field, but greater challenges lie ahead. This chapter also examines the main challenges, opportunities and key enabling conditions for progress.

2 The state of play

2.1 The scale of the challenge

Estimated investment needs up to 2050

There is no complete estimate yet of resources needed to make the transition to a green economy. One indication of green investment gaps for low-carbon energy supply and energy efficiency at the global level is provided by the IEA Energy Technology Perspectives 2010, based on CO₂ emission reduction targets. This high-end estimate does not include other aspects such as resource efficiency across sectors. The IEA BLUE Map scenario aims to halve worldwide energy-related CO₂ emissions by 2050. Investments required from 2010 to 2050 in this scenario are US\$ 46 trillion higher – an increase of 17 per cent – than what is required in the Baseline scenario. This corresponds to approximately US\$ 750 billion per year up to 2030 and US\$ 1.6 trillion per year from 2030 to 2050 (IEA 2010).

Additional investment needs under the BLUE Map scenario – which increases projected global investment needs to US\$ 316 trillion by 2050 – are dominated by the transport sector, which take up 50 per cent of total additional investments, particularly in the area of alternative vehicle technologies. The buildings sector absorbs 26 per cent of the additional investment, energy supply 20 per cent and industry 4 per cent. These indicative amounts correspond, on average, to the scenarios modelled for the Green Economy Report, which analysed investments averaging US\$ 1.35 trillion per year over 2010 to 2050, across a range of sectors – not just those related to greenhouse gas (GHG) emissions.

Alternatively, an earlier IEA study estimated (IEA 2009) that over the next 30 thirty years, US\$ 1 trillion annually is required to enable the world's energy infrastructure to maintain and extend the supply of power to more people (US\$ 500 billion) and to finance the transition to a low carbon, cleaner energy infrastructure (a further US\$ 500 billion). The projected annual shortfall to drive this low-carbon transition in developing economies alone is US\$ 350 billion. While relying heavily on an industrial approach to reducing carbon emissions, the IEA estimates can be considered as a high-end estimate of annual investment needs and correspond to a range of 1 to 2 per cent of global GDP.

Estimates by the private financial sector also underline the scale of the challenge. The World Economic Forum (WEF 2010a) and Bloomberg New Energy Finance calculate that clean energy investment must rise to US\$ 500 billion

per year by 2020 to restrict global warming to 2°C. HSBC estimates the transition to a low carbon economy will see a total growth in cumulative capital investments of US\$ 10 trillion between 2010 to 2020 (HSBC 2010).

Furthermore, the concept of “additionality” is fundamentally important. In the context of the UN Framework Convention on Climate Change (UNFCCC); additionality refers to an effort that is supplemental to the business-as-usual (BAU) scenario in at least two areas: the additionality of financial contributions of developed countries beyond BAU official development assistance (ODA) to assist climate change adaptation in developing countries; and the additionality of investment to reduce GHG beyond BAU. Additionality of financial resources to the widely agreed target for ODA of 0.7 per cent of developed country gross domestic product (GDP) is the contribution that developing countries seek from developed nations as a key element of a global resolution of climate change problems in the context of the UNFCCC and the Kyoto Protocol (KP) (UNFCCC 1998). Despite a decade of attempts to define additionality, the concept continues to be poorly understood and its application contested. However, additionality is likely to continue to be an important criterion for climate finance beyond 2012.

Breakdown by sector

Given the pioneering and cross-cutting nature of research on greening the economy, the quantification of the demand for finance and investment to support a global green economy for each major economic sector is a work in progress. However, the data in Table 1, drawn from information in the sectoral chapters of this Green Economy Report (GER), give a broad range of estimated annual investments required to make this transition. The spread of targets illustrates the need for common metrics for finance and investment in this arena, to allow proper comparisons. (See disclosure requirements discussed in Section 5 of this chapter, Greening Global Finance & Investment: Enabling Conditions.)

Based on a range of specific sectoral policy targets, the Green Economy Report modelling allocates investments totalling 2 per cent of global GDP across the range of given sectors, with the heaviest emphasis in transforming key sectors such as buildings, transport, and energy. These investment allocations are largely consistent with assessments taken from other sources, such as IEA and estimates associated with achieving the MDGs. The estimated annual investment for all sectors

Sector	Green Economy Report investment allocation 2011 (US\$ bn/yr., see Note 1)	Investment assessment (US\$ bn/yr., see Note 1)	Details
Agriculture	108		Target: increase and maintain nutrition levels to 2800 to 3000 Kcal/person by 2030
Buildings	134		Target: increase energy efficiency to reach energy consumption and emissions targets set in IEA's BLUE Map scenario
		308	IEA ETP 2010 BLUE Map scenario, Additional (see Notes 3 and 4).
Energy (supply)	362		Target: increase penetration of renewables in power generation and primary energy consumption to at least reach targets set in IEA's BLUE Map scenario
		233	IEA ETP 2010 BLUE Map scenario, additional (see Notes 3 and 4).
		500	World Economic Forum (2010a) estimate of annual spending on clean energy necessary by 2020 to restrict the increase in global average temperatures to 2°C
		611	European Renewable Energy Council and Greenpeace Energy [R]evolution (2010) Advanced Revolution scenario estimate of average global investment in renewable energy to 2007 to 2030 (see Note 5).
		460 – 1,500	HSBC (2010) estimate of total investments in low carbon energy generation (supply) and energy efficiency and management (demand), required to build a low-carbon energy market by 2020 (see Note 6).
Fisheries	108		Achieve maximum sustainable yield by an aggregate world cut in fishing effort of 50 per cent by decommission of vessels, reallocation of labour force, and fisheries management.
		90 – 280	Same (from Global Economy Report fisheries chapter analysis).
Forestry	15		Target: 50 per cent reduction in deforestation by 2030 as well as increased planted forests to sustain forestry production.
		37	Effective management of the existing network of protected forests and 15 per cent of land area in each region (Balmford et al. 2002) – adjusted for inflation.
		2 – 30	REDD+ (more an assessment of potential flow of funds).
Industry	76		Target: increase energy efficiency to reach energy consumption and emissions targets set in IEA's BLUE Map scenario.
		50 – 63	IEA ETP 2010 BLUE Map scenario, additional (see Notes 3 and 4).
Tourism	134		
Transport	194		Target: increase energy efficiency to reach energy consumption and emissions targets set in IEA's BLUE Map scenario, and expand public transport.
		325	IEA ETP 2010 BLUE Map scenario, Additional (see Notes 3 and 4).
Waste	108		Target: reduce the amount of waste going to landfills by at least 70 per cent.
Water	108		Target: Meet Millennium Development Goal (MDG) to halve the number of people without access to water and sanitation by 2015, plus reduce water intensity (without quantitative target).
		18	Meet MDG to halve the number of people without access to water and sanitation by 2015 (Hutton and Bartram 2008).
		50	Meet world's water needs (2030 Water Resources Group, McKinsey).
Total	1,347	1,053 – 2,593	(See Note 2).

Notes to Table 1:

1. All amounts are annual investment figures; Green Economy Report investment allocation in 2010 dollars; IEA investment needs are in 2007 dollars (difference should be considered negligible relative to imprecision of estimates). The GER investment portfolio allocates investments totalling 2 per cent of global GDP across the range of given sectors, with a number of specific sectoral targets, which are described in the details column. These will rise over the period 2011 to 2050 as economic growth proceeds to reach US\$ 3.9 trillion in 2050 (in constant 2010 dollars). Investment needs are assessments generally taken from other sources, but many of which have influenced the allocation of the Green Economy Report investment portfolio, especially IEA.
2. For the investment assessment under the right-hand column, the range of total investments corresponds to the sums of low and high estimates per sector.
3. Most IEA figures are simple averages of estimated total investment over 2010 to 2050; however, it appears that lower investments are projected for earlier years, and higher figures for later years.
4. The figures for IEA Energy Technology Perspectives (2010) BLUE Map Scenario represent only the additional investment, totalling an average of US\$ 1.15 trillion per year, and do not include the projected investments for the reference scenario, which involves investments to meet increased energy demand through a continuation of existing investment trends.
5. The European Renewable Energy Council and Greenpeace's Advanced [R]evolution scenario have a key target for the reduction of CO₂ emissions down to a level of around 10 gigatonnes per year by 2050, and a second objective of phasing out of nuclear energy. The [R]evolution scenario has similar target, but assumes a technical lifetime of forty years for coal-fired power plants, instead of 20 years; the estimated average global investment needed for this scenario is US\$ 450 billion (European Renewable Energy Council and Greenpeace 2010).
6. These estimates are for HSBC's Conviction scenario, which projects "the most likely pathway to 2020", which sees the EU meeting renewable but not energy efficiency targets, limited growth in clean energy in the USA, and China exceeding current clean energy targets. This scenario does not correspond to any specific climate policy target. In addition to the supply of low carbon energy, this estimate also includes energy efficiency investments that would be undertaken in transport, buildings and industry sectors. In terms of the breakdown, HSBC estimates that US\$ 2.9 trillion will be required between 2010 and 2020 in total for low carbon energy supply and US\$ 6.9 trillion for energy efficiency and management.

Table 1: Annual green economy investment by sector

	Total assets of international banking (2009)/ Global bank assets (2008)	Total assets under management in 2009 (covering public equities, real estate, bonds, asset-backed securities, etc.)	Premium volume (2008)
Global market size	Approx. US\$ 34 trillion (BIS) / approx. US\$ 97.4 trillion (IMF, BIS, etc.)	Approx. US\$ 80 trillion (IFLS Research)	Approx. US\$ 4.3 trillion (Swiss Re, IFLS Research)
Share committed to sustainability	Approx. US\$ 50 trillion of bank assets signed commitment to sustainability	Approx. US\$ 25 trillion of assets signed to PRI (UNEP FI/PRI)	In excess of US\$ 500 billion of insurance premium volume committed to sustainability

Notes to Table 2:

1. The figures in this table are indicative and should be interpreted with caution due to existence of other industry collaboration initiatives that provide frameworks for commitment to sustainability. Therefore, the share of respective global markets committed to sustainability could be higher.
2. Financial institution types covered in the asset management classification in this table include pension funds, insurance funds, mutual funds, sovereign wealth funds, private equity and hedge funds.
3. Shares committed to sustainability are rough estimates and provide an indication of financial institutions engagement to sustainability (e.g. commitment to statement and principles of UNEP FI/PRI).
4. Total assets of banks committed to sustainability given in this table also include assets held by banks via various investment instruments and in a few cases include insurance instruments.

Table 2: Selected indicators of the global market size by sector and the share committed to sustainability, 2008-2009 (banking, investment and insurance sectors)

Sources: The Bank for International Settlement (Securities statistics and syndicated loans 2007-2009), IMF (Global Financial Stability Report 2009), TheCityUK, Swiss Re, UNEP FI and PRI

2008 AUM figures in US\$ billions	Total signatory internally active AUM	Internally active assets subject to integration via PRI signatories	Share of signatory internally active AUM subject to integration	Market size	Share of total market subject to integration by PRI signatories*
Listed equity (developed markets)	2,264	1,337	59%	27,107 ^a	5%
Listed equity (emerging markets)	308	185	60%	5,313 ^a	4%
Fixed income-sovereign	3,430	690	20%	24,596 ^b	3%
Fixed income-corporate issuers	1,978	883	45%	6,380 ^b	14%
Private equity	232	105	45%	2,492	6%
Listed real estate or property	289	74	26%	694 ^d	14%
Non-listed real estate or property	303	239	79%	10,915 ^e	3%
Hedge funds	210	25	12%	1,500	2%
Infrastructure	67	39	59%	19,900 ^f	0.2%
Total	9,081	3,578	39%	98,897	4%
2009 AUM figures in US\$ billions	Total signatory internally active AUM	Internally active assets subject to integration via PRI signatories	Share of signatory internally active AUM subject to integration	Market size	Share of total market subject to integration by PRI signatories*
Listed equity (developed markets)	3,674	2,525	69%	37,500 ^a	8%
Listed equity(emerging markets)	700	478	68%	9,589 ^a	6%
Fixed income-sovereign	5,253	1,579	30%	30,232 ^b	6%
Fixed income-corporate issuers	2,437	1,373	56%	7,329 ^c	22%
Private equity	201	122	61%	2,337	9%
Listed real estate or property	297	172	58%	678 ^d	34%
Non-listed real estate or property	497	418	84%	10,256	5%
Hedge funds	188	36	19%	1,700	5%
Infrastructure	71	63	89%	21,600 ^f	0.4%
Total	13,317	6,766	51%	121,220	7%

a. Split developed and emerging markets by MSCI country membership. Deduct listed real estate by market capitalisation weighting. b. Sovereign plus quasi-sovereign. c. Corporate plus high yield but excluding asset backed. d. Figures for public equity. e. Figures for private debt, public debt and private equity. f. Estimated total stock of infrastructure assets in public ownership.

* This per cent conservatively underestimates the findings of the survey. In fact, the numerator does not include the externally managed funds, to avoid some double counting. Moreover, the market size in the denominator includes passive managed funds, which instead are not measured in the numerator as not necessarily subject to Principle 1.

Table 3: ESG integration for internally actively managed AUM (assets under management)¹ relative to total investment market

Source: Principles for Responsible Investment (2010)

1. Assets Under Management (AUM) - market value of assets that an investment company manages.

for the period 2011 to 2050 based on the 2 per cent of GDP green economy scenario is nearly US\$ 1.35 trillion on average. For the nine sectors covered, excluding fisheries, the estimate for the lower range for annual investment 2011 to 2050 is almost US\$ 1.2 trillion per year. This estimate rises to over US\$ 3.4 trillion per year, a high-end estimate that applies to later decades, when global GDP is presumably much higher.

The table clearly demonstrates very significant overall investment needs to transition the green economy as well as the considerable range for some key sectors, such as energy, to move towards a more sustainable basis for economic growth. It shows in particular the large volumes of resources required to expand and transform the inventory of built capital, in the form of energy supply, public transport, and energy and resource-efficient buildings. The table also shows the resources required to change to a sustainable way of managing natural capital assets such as forests, fisheries and agricultural lands.

It is estimated that more than 80 per cent of the capital needed to address climate change issues in future decades will come from the private sector (Parry et al. 2009), highlighting the significant role of the private sector in the transition to a green economy. The message for both policy makers and the financial services sector is clear: to achieve this transition by 2050, substantial financial resources, including public, private, hybrid and new blended approaches, will have to be mobilised. In addition, private resources and capital markets will have to play an instrumental role in providing the required finance and investment. This will require appropriate regulatory frameworks comprising a rich policy mix to stimulate demand for these funds, together with targeted flanking policies to protect households below the poverty line from possible unintended consequences on the costs of basic goods and services.

Tracking new trends in finance and investment flows

The roles of lending, investment, insurance and public finance all remain critical in greening different economic sectors and establishing more resource efficient societies. While global ODA often processed by government-owned agencies dropped (United Nations 2008) DFIs was estimated to be around US\$ 108 billion in 2010. website), annual private finance goes into the

trillions (TheCityUK 2011). The critical role for public finance lies in being a catalyst, early stage investment provider, co-sharer of risk and guarantor of public infrastructure and services. As far as private finance is concerned, the relative size of lending, investment and insurance as well as their commitment to sustainability is provided in Table 2.

The tracking and precise quantification of financial and investment flows to greening and social responsibility, across asset classes, geographies and sources (public, private, public-private, and hybrid) is a work in progress. Some asset classes, notably cleaner energy technologies, already have sophisticated and globally recognised methods in place to accurately capture annual global flows. These are highlighted later in this chapter. The following section provides a snapshot of how investment capital from the world's largest institutional investors is starting to flow to the green economy, but is not comprehensive in its coverage given the information, data, and methodological challenges for what, in many cases, are nascent green economy-related asset classes.

At the global level, the quantification of how ESG considerations are integrated into various asset classes; for example, listed equity (developed and developing markets), fixed income (sovereign), fixed income (corporate), private equity, real estate and property (listed and non-listed), hedge funds and infrastructure, only commenced systematically in 2008, thanks to the United Nations-backed Principles for Responsible Investment (PRI). In 2009, it was estimated that the global market size for overall actively and passively managed assets² was just over US\$ 121 trillion, up from nearly US\$ 99 trillion in 2008 (PRI 2010). Of these assets, controlled by a broad range of large institutional investors (such as pension funds, sovereign wealth funds, insurance companies, and foundations), the internally actively managed component of the investable universe, some 4 per cent (US\$ 3.578 trillion) in 2008, rising to 7 per cent (US\$ 6.766 trillion) in 2009, were subject to integration of ESG considerations (see Table 3 for a complete breakdown)

2. Active management of assets refers to a strategy where a portfolio manager makes specific investments with the aim to outperform an investment benchmark index. Passive management refers to a strategy where a portfolio manager makes investments in line with a pre-determined investment strategy.

3 Emerging investment in the green economy

3.1 From crisis to opportunity

In recent years, a broad range of financial developments have emerged that support the transition to a green economy. Despite the turbulence in world markets and the lack of an international regulatory framework to direct finance towards a green economy, capital markets have continued to evolve in ways that can help foster a green transition. Some examples include:

- The arrival of cleaner energy technologies as new asset class and the four-fold increase in new investment in sustainable energy from US\$ 46 billion in 2004 to US\$ 162 billion annually by 2009 (UNEP SEFI 2010);

- The creation of carbon markets where the value of annual trading volumes rose to US\$ 122 billion by;

- 2009. Studies estimate that emissions were reduced by around 120m to 300m tonnes in the first three years of the European Union Emissions Trading System (Pew Center on Global Climate Change 2008); and

- The possibility of new markets associated with more effective management of natural resources, the provision of integrated urban environmental infrastructure and low carbon transport systems for cities, as well as low carbon industrial, commercial and residential property.

As indicated in the previous section, private capital sources are estimated to supply more than 80 per cent of the investment required for the transition to a low carbon economy. Access to capital and the magnitude of the necessary investment remains significant. The ability of public and private finance to interact within stable and resilient capital markets will be a key determinant if capital is to be provided at a sufficient scale to finance the transition to a green economy in a timely manner. Given the significant role that private capital sources are expected to play in the transition to a low-carbon economy, the smart deployment of public funds supported by a coherent policy framework will have a pivotal role in catalysing and leveraging greater private investment in a green economy. In the post-crisis government stimulus packages, some US\$ 470 billion out of US\$ 3 trillion-plus in public funds committed (HSBC 2009) to head off a severe global depression

was earmarked for low-carbon and environmental infrastructure investments.

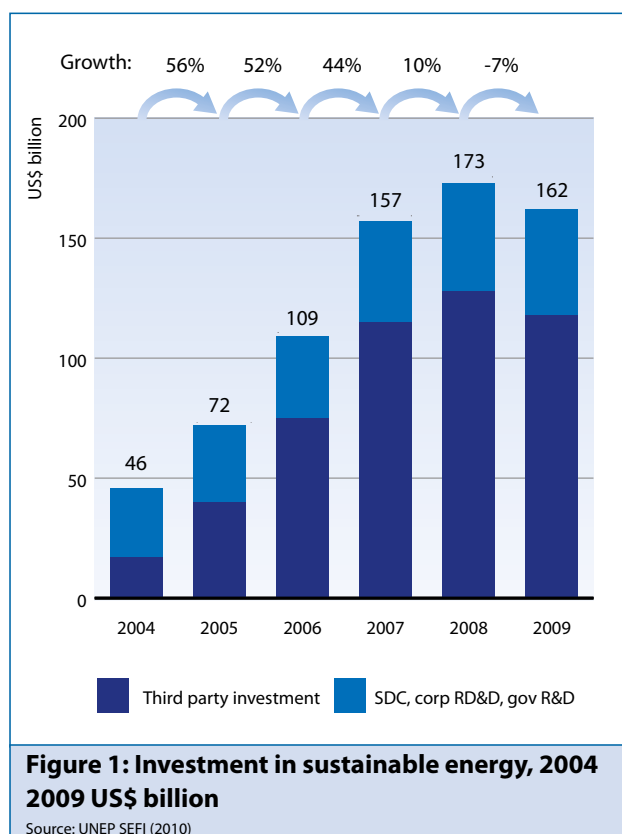
Together with these recent developments, the role of multilateral financial institutions (MFIs), such as the World Bank, International Finance Corporation (IFC), and the thirty-plus regional MFIs, national development banks, as well as export credit and investment guarantee agencies, will be critical in fostering new and emerging niches in financial markets as private finance and investment adjust to and gain confidence in evolving green economy policy frameworks. Importantly, to archive best environmental and social outcomes, incentives should be designed and used in areas with the greatest potential for reducing GHG emissions along with job creation and other green economy objectives. .

3.2 New markets and instruments

Renewable energy

The renewable energy sector is by far the largest destination for green investment in the GER scenarios. Financial markets have already been mobilising substantial amounts. A total of around US\$ 557 billion of capital was deployed to the renewable energy market between 2007 and mid-2010 (UNEP SEFI 2010). This market has seen a four-fold increase in new investment from US\$ 46 billion in 2004 to US\$ 162 billion annually in 2009 (see Figure 1). The US\$ 30 billion fast track financing pledged at the 2009 United Nations Climate Change Conference in Copenhagen (COP 15) has also focused greater business and investor interest in this market (see Box 1). Furthermore, analysts expect financial flows to this market to increase considerably in coming years. One recent study indicates that the low-carbon energy market size will reach US\$ 2.2 trillion by 2020 (HSBC 2010).

Institutional investors, despite being considered risk averse and conservative, provided some 65 per cent of the finance for renewable energy in 2008 to 2009, contributing US\$ 192 billion out of a total of US\$ 294 billion. The remainder was spread among venture capital (VC)/private equity (PE), and research and development (R&D) sources, with some public stimulus money in 2009, offsetting a decline in VC/ PE funds (UNEP SEFI 2010). Notably, the Cleantech Group predicted that 2010



would end up as the second largest year on record for VC investment in clean technology with a full year total of about US\$ 7.3 billion, less than the US\$ 8.5 billion raised in 2008, but well ahead of the US\$ 5.7 billion raised in 2009 (Cleantech Group and Deloitte 2010). The increase in VC and PE investments in renewables will likely have a multiplier effect over time by sending signals of steady sectoral growth to other capital sources.

However, the obstacles remain considerable to scaling up investment in this sector to the levels required for a global green economy. Currently, renewables supply less than 5 per cent of the primary energy for power generation globally. The barriers to increasing this figure are financial and economic and include:

- Higher upfront costs, capital-intensive nature of projects and the use of subsidies for conventional energy;
- Political and regulatory; generally, policies do not favour renewable technologies;
- Environmental and social; for example, planning objections;
- Technical; for example, the intermittent nature of renewable technologies, and;
- The scale of the projects, mainly higher transaction costs.

Overcoming these barriers will require a more supportive and stable policy and regulatory framework (UNEP FI 2004).

A recent report by the World Economic Forum (WEF) and Bloomberg New Energy Finance estimated that moving to a low-carbon energy infrastructure and restricting projected global warming to below 2°C will require global investment in clean energy of approximately US\$ 500 billion per year by 2020 (WEF 2010a). HSBC similarly concluded that building the low-carbon energy market would require total capital investments of US\$ 10 trillion between 2010 to 2020 (HSBC 2010). However, public and private investment in clean energy in 2009 was far below needed levels. Furthermore, given the expected geographic shift of the global economy, as much as US\$ 400 billion of climate change mitigation, including investment into energy, will have to flow to the developing and emerging world (World Bank 2010a).

Emergence of green property as an asset class

Property investments have a considerable influence on both financial markets and carbon emissions. The outlook for green property investment is encouraging. The estimated significant growth in ESG integration levels in listed real estate and property from 26 to 58 per cent (see Table 3), the successful launching and closing of over 18 “improver” property funds from 2006 to 2010 financing the energy efficiency retrofitting of commercial buildings (Preqin 2004-2010), numerous green property development funds, and the increasing preference of occupants for green offices and residences are key indicators of green property becoming an emerging and increasingly attractive asset class.

The built environment, through its construction and use accounts for 40 per cent of both global energy use and carbon dioxide emissions. It is responsible for 30 per cent of raw materials usage and 20 per cent of water usage (UNEP SBCI 2007). Buildings have also been identified as the greatest potential source of carbon mitigation at lowest cost (IPCC 2007). Many actions that investors and occupiers of property can take to reduce overall environmental and social impacts, including improving the environmental efficiency and social utility of investable properties (UNEP FI PWG 2011b), are low cost, estimated to be worth around US\$ 12 trillion globally, (DTZ Research MiP 2009). Such actions are immediately economic – a good example of eco-efficiency (Ceres 2010).

There is growing recognition of a range of economic and financial drivers to enhance the environmental credentials of existing buildings in rental and equity markets. For example, a 2009 report (RICS 2009) found an aggregate premium in rental rates for buildings with a sustainable rating of 3 per cent per square foot, or

above 6 per cent adjusted for building occupancy levels. In terms of selling prices, the report found a premium in the order of 16 per cent. Further, empirical evidence of such valuation differentials is growing (RICS 2009). The business case for green property investment has emerged strongly with a considerable effect on the operation of the market. However, vast opportunities remain to scale up green property investment.

It is also increasingly being argued that collectively, ever more stringent regulations, rising energy prices and changing occupier and investor preferences will increasingly affect the context within which property investment and letting decisions take place (UNEP FI PWG 2011a). As a result, the expectation is growing that, over time, greener buildings will experience higher net income growth through lower depreciation and lower operational costs, and as a result, be viewed as less risky. Enforceable regulations that drive higher environmental standards, greater consistency between fiscal incentives

and policy objectives/targets for GHG reductions in buildings, and the promotion of metrics systems that are more compatible, simpler, more relevant to investors and more capable of capture across whole portfolios will be critical in accelerating the greening of property market.

Forestry – Reducing Emissions from Deforestation and Forest Degradation (REDD+)

For the financial services and investment community, understanding and developing prospective markets related to biodiversity and ecosystems services (BES) is challenging. The coverage of actual demand and the estimates of potential market value for the banking, insurance and investment community are poor. However, several recent initiatives have begun to frame the potential in nascent existing markets and prospective future ones. For example, the 2008 value of the bio-carbon market was estimated by the Ecosystem Marketplace to be at US\$ 37 million (see Table 4). This estimate includes the increasingly important concept of REDD+ (see Box 2).

Box 1: Copenhagen fast track financing – a status update

The Copenhagen Accord notes developed countries' commitment to provide fast track financing of US\$ 30 billion for the 2010 to 2012 period and building to US\$ 100 billion per year by 2020.

This fast track financing will enhance action on mitigation, including Reducing Emissions from Deforestation and Forest Degradation (REDD), adaptation, technology development and transfer, and capacity building. Fast track financing will not only enhance implementation of the UNFCCC by developing countries between now and 2012, but also aims to help them prepare for sustained implementation beyond 2012. It is thus often referred to as enabling readiness for the post 2012 period. It will also provide lessons for climate financing over the longer term. The fundamental questions regarding the issue of fast track financing today are:

■ **Commitments at the country level** According to the World Resources Institute (WRI), country pledges today add up to roughly US\$ 27.9 billion;

■ **Are funds being disbursed or earmarked?** Of the total of US\$ 30 billion, only approximately US\$ 5 billion have been committed in national budgets and allocation plans, and only thirty-two concrete programme activities have been earmarked to be supported by these funds. Developed countries, therefore, still have much to do to concretise their

pledges to remain credible regarding their financing commitments;

■ **Are funds dedicated towards climate financing new and additional?** At the time of writing of this report, it remains unclear as to whether the funds pledged will be entirely additional to existing commitments in the areas of climate change mitigation and adaptation in developing countries or, more broadly, ODA. However, some pledged funds will be additional. It appears that most, if not all, funding denominated as fast track financing under the Copenhagen Accord will be counted towards developed countries' ODA efforts and reported as such to the OECD's DAC (Development Assistance Committee) office. Past ODA efforts by developed countries have repeatedly been criticised for not reaching the target of 0.7 per cent of GDP, commonly referred to as a level of ODA commitments towards which developed countries should aim; and

■ **Will public fast track money leverage private climate finance?** Most, if not all, of the programmes put forward as qualifying for fast track financing aim at increasing the institutional capacity and readiness of developing countries to initiate climate change mitigation activities, rather than at directly reducing GHG emissions. These types of activities usually lack a commercial dimension or potential for private participation and, as such, will not be able to attract or generate private climate financing.

BES asset class	Market value	Year	Market type	Source
Biodiversity mitigation/offsets	US\$ 1.8 – 2.9 billion	2008	Cap-and-trade/ voluntary	Ecosystem Marketplace, 2009
Bio-carbon:				
Voluntary over-the-counter (forestry carbon), incl. REDD+	US\$ 31.5 million	2008	Private voluntary	Ecosystem Marketplace, 2009
Chicago Climate Exchange – forest carbon	US\$ 5.3 million	2008	Private voluntary	
Clean Development Mechanism (CDM) – afforestation/reforestation	US\$ 0.3 million	2008	Cap-and-trade	
Cosmetics, personal care, pharmaceuticals: bio-prospecting contracts	US\$ 30 million	2008	Private voluntary	The Economics of Ecosystems and Biodiversity study (TEEB) D3
Certified agricultural products, incl. Non-Timber Forest Products (TFPs)	US\$ 40 billion	2008	Private voluntary	Bishop et al., 2008. Building Biodiversity Business.
Certified forest products – Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC)	US\$ 5 billion (FSC certified products)	2008	Private voluntary	TEEB D3
Payments for Watershed Services (private voluntary)	US\$ 5 million (various pilots e.g. Costa Rica, Ecuador)		Private voluntary	TEEB D3
Payments water-related ecosystem services (government)	US\$ 5.2 billion	2008	Public	TEEB D3
Other payments for ecosystem services (government-supported)	US\$ 3 billion	2008	Public	TEEB D3
Private land trusts, conservation easements (e.g. North America, Australia)	US\$ 8 billion (in the USA alone)	2008	Public	TEEB D3

Table 4: Market potential for various BES asset classes

Source: UNEP FI BES (2010)

REDD+ and related initiatives, such as new insurance products related to forest carbon, (see Box 3) demonstrate an increased understanding of the potential market scale for financial services and the policy steps needed to facilitate development of such markets. Appropriate, clear and consistent global and national policy frameworks will be critical if the BES market is to be developed at scale. For many mainstream insurers, insurance premiums for managed forests barely reach the scale to classify it as a market per se. However, given the right global policy choices within climate negotiations in the coming years, the carbon market in forests could reach US\$ 90 billion by 2020 (CDC Mission Climat 2008).

Green bonds

The green bond market is still relatively small, but has the support of triple AAA rated institutions and growing momentum. Bonds are a very regular means for governments, institutions and even large corporations to raise debt (borrow money) from the capital markets. In recent years, the term green bonds, or sometimes clean energy bonds or climate bonds, has been increasingly featured in discussions about finance for clean development³. Green bonds are simply a variant of general bonds wherein the issuer of the bond guarantees to use the money raised for some specific environmental purposes. They are designed to particularly attract investors who wish to lend money for these purposes.

The market for green bonds is still very limited. Although issuance of green bonds is relatively small in size, current issues provide an encouraging example. EIB and the World Bank (see Table 5) issued various green and climate-friendly bonds between 2007 to 2010 valued at US\$ 1 billion and US\$ 1.5 billion respectively. Additionally, the IFC has issued four-year US\$ 200 million fixed-rate green bonds for 2010 to 2014 to finance renewable energy and energy efficiency projects in developing countries. In 2010, the ADB and African Development Bank both issued their first Clean Energy Bonds.

While issuances of green bonds from the multilateral development banks have garnered much of the recent attention, green bonds have also been used at a municipal level to finance green projects. For example, in the United States, a green bond is a type of tax-exempt municipal bond, issued by organisations and local governments that have been qualified by the US federal government to do so. The full name for these green bonds is a Qualified Green Building and Sustainable Design Project Bond. These green bonds are meant to promote environmentally friendly land use and development, for example, the Destiny USA retail complex in New York that expects to have all of its energy needs met by renewable sources.

The global market size of bonds in emerging markets alone stood at US\$ 79 billion in 2009 (IMF 2009), which suggests a greater potential for green bonds, for example, energy efficiency bonds for large scale retrofitting of composite urban units. High-grade fixed income investments, such as bonds, represent a promising instrument for

3. The Climate Bonds Initiative is a project established in 2009 by the Network for Sustainable Financial Markets (NSFM) operating as a joint project of NSFM and the Carbon Disclosure Project. [http:// climatebonds.net](http://climatebonds.net).

Box 2: Overview of REDD+

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low- carbon paths to sustainable development. REDD+ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

Much of protecting existing forests (REDD+) or reforesting areas (afforestation and reforestation

– A/R) is achievable at considerably lower costs than other abatement technologies, and brings immense potential co-benefits such as biodiversity conservation and watershed protection – “free” services with an estimated value of up to US\$ 1 trillion/year by 2100. Nevertheless, achieving this potential will require considerable investment, estimated at a minimum of US\$ 17 to 33 billion per year just to halve the rate of tropical deforestation by 2030 (The Eliasch Review 2008). Investment on this scale is unlikely to come from governments alone, and thus active participation of private sector financial institutions is essential. This in turn depends on making protection and enhancement of forests investable while intensifying efforts to accurately measure and report on carbon stored in forests. The main investment sources in the forestry sector in general (i.e. other than in the context of climate mitigation) are private (93 per cent) representing about 1.5 per cent of global direct investment (UNEP FI 2011a and UNEP FI 2011b).

The forestry sector, REDD+, and A/R can be of interest to financial institutions if they can not only be profitable, but to also diversify lending, insurance and investment portfolios. This sector can also be of interest to financial institutions because of political and associated reputational imperatives. A range of

political, market and general business risks need to be considered. Risk mitigation tools available to financial institutions to make REDD+ and A/R projects more attractive include guarantees, insurance, and bonds.

Although negotiations are still ongoing at UNFCCC level about the exact shape and structure of a REDD+ mechanism, around 40 countries are already engaging in REDD+ strategy development (Phase 1) and pilot activities. It is expected that private sector finance for REDD+ will scale up as initial reforms and institutional strengthening take effect and REDD+ programmes are scaled up (Streck et al. 2010). The five current scenarios that are on the table within international climate negotiations include

Scenario 1: National crediting under a UNFCCC agreement.

Scenario 2: Sub-national or project crediting under a UNFCCC agreement.

Scenario 3: The nested approach as hybrid solution between Scenarios 1 and 2.

Scenario 4: International fund with national-level incentive payments.

Scenario 5: Voluntary markets only (no international REDD agreement).

The most promising policy option for private sector involvement in REDD seems to be the nested approach described in Scenario 3. In the absence of a global climate agreement, market players need to be prepared to make use of the opportunities within the voluntary market, or dedicated national cap-and-trade schemes that allow for REDD offsets (e.g. future US scheme and/or EU ETS Phase 3).

Source: UNEP FI

mainstreaming institutional investors to deploy larger amounts of investment in the environmental sector. With bond holdings representing 31 per cent of financial assets worth US\$ 39 trillion in 2009 (Capgemini 2009), high net worth individuals represent a significant segment of potential demand for green bonds.

Equally, the public sector at the national and international levels should support the growth of these emerging segments by funding research and promotional activities to foster a better understanding of green bond

markets, green commodity markets, and environmental and social stock exchanges. The Climate Bonds Initiative, a global civil society network launched in 2009, develops policy proposals for governments, finance and industry, and develops advice on large-scale climate mitigation opportunities suitable for long-term debt finance (The Climate Bonds Initiative 2009).

Carbon markets

Carbon markets comprise one of the key areas of green finance and provide an important discovery mechanism for

Issue (Rating)	Amount	Maturity Date	Coupon	Investors
Inaugural Issue Swedish Krona (SEK) denominated Green Bond (Aaa/AAA)	2.85 billion SEK (in three tranches)	November 2014	3.5 per cent p.a.	Swedish National Pension Funds Skandia Life UN Staff Pension Fund Others
First US\$ denominated Green Bond (Aaa/AAA)	US\$ 300 million	April 2012	Floating rate	State of California
Third World Bank Green Bond (Aaa/AAA)	US\$ 180 million (in two tranches)	December 2013	2 per cent p.a.	California State Teachers Retirement System (CalSTRS) Swedish National Pension Funds Swedish insurance provider SEB Trygg Liv UN Staff Pension Fund, Others
Fourth World Bank Green Bond (Aaa/AAA)	NZD 150 million	January 2015	5.23 per cent S.A.	Japanese investors
IFC Inaugural Green Bond (Aaa/AAA)	US\$ 200 million	April 2014	2.25 per cent p.a.	Details not available

Table 5: Recent green bond issues by the World Bank Group
Source: World Bank and IFC websites

the price of carbon. In total, 8.7 billion tonnes were traded in 2009 (see Figure 2), with a value of US\$ 144 billion (US\$ 123 billion in allowance-based cap-and-trade) trading and US\$ 21 billion in project-based deals under instruments such as the CDMs. The largest carbon market by far is the European Union Emissions Trading System (EU ETS), the annual value of which rose to US\$ 122 billion in 2009.

There is considerable uncertainty about the future structure of carbon markets following an inconclusive

outcome to the 2009 UN Climate Change Conference in Copenhagen and a stalemate on establishing a national carbon trading scheme in the US (TheCityUK 2010). Primary CDM transactions, making up the bulk of the project market, nearly halved to 211 million tonnes in 2009 from 404 million tonnes in 2008, due to difficulties in accessing finance, lack of bankability of CDM and Joint Implementation (JI) credits after 2012, and ever lengthening delays in the CDM process (see Figure 2).

Box 3: Building an insurance market for forest carbon

Carbon markets have not tackled emissions from the loss of natural forests. There are several concerns: the issues of likely permanence, additionality, leakage, measuring and monitoring, and risks of project-based changes in carbon stocks or GHG emissions. It is a significant gap in mitigation - as much as 20 per cent of anthropogenic GHGs are estimated to originate from land use change. Unlike the reduction or avoidance of GHG emissions with all other types of mitigation activities, GHG sequestration into biomass is non-permanent. Sooner or later, the sequestered carbon will be re-released into the atmosphere. In the case of forestry this can happen due to natural hazards, land-use decisions and other events (UNEP FI 2008).

To date, regulators have treated forest-based GHG permits as temporary, which has greatly reduced their value and thus demand. In the voluntary certificate sector, the approach for addressing non-permanence is to require projects to maintain adequate buffer reserves of non-tradable carbon credits to cover unforeseen losses in carbon stocks.

Another alternative is the deployment of insurance and other financial risk management instruments to guarantee the permanence of carbon sequestered

through forests. This means that the land occupied by the buffer would be available for a variety of purposes. In principle, the loss of carbon from a forest is insurable, and the use of financial tools is superior economically. Private sector providers of forest insurance focus on plantations, not public and natural forests. The primary reason is the more sophisticated risk management systems (e.g. watchtowers and firebreaks, fire-fighting personnel, equipment and procedures) in place for privately owned forests, where there is a clear financial interest. Even for plantations, the total acreage insured is low.

The main reasons for the lack of demand are its high exposure to catastrophic losses (exacerbated by climate change); low demand and inadequate pricing; and insufficient risk management, compounded by the possibility of moral hazard. Also, forest risks require specialist knowledge, and the valuation of forest carbon is difficult. While forest insurance products have been underwritten via traditional, indemnity-based insurance policies, some are also exploring the viability of alternative risk transfer and financing solutions including catastrophe bonds. There is some evidence that public sector forest insurance has been successful, for example, in Japan.

Source: UNEP FI (2008)

One sign of this was the change in fortunes of the Chicago Climate Exchange (CCX), which announced in October 2010 that it would be ending its operations as a clearing house for a voluntary cap-and-trade scheme among industrial members. At its inception in 2003, CCX was viewed as a proving ground, and at one time more than 400 members, including many large utilities and to learn how a cap-and-trade system would work. Their emission reductions accounted for about 88 per cent of the nearly 700 million metric tonnes of carbon dioxide reduced by CCX since 2003 (Chicago Climate Exchange 2011). Carbon offsets account for the rest. The voluntary members' scheme was scheduled to terminate in 2010 and, after cap-and-trade legislation failed to pass in the US Senate, renewal was deemed infeasible. The exchange will continue trading voluntary carbon offsets, a different kind of contract created by projects, such as planting trees, to reduce carbon dioxide or other GHGs.

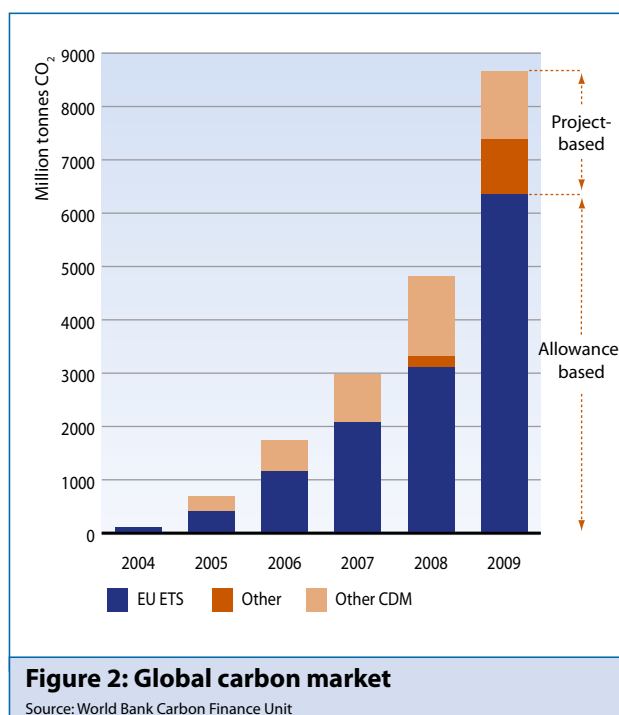
In the U.S. Regional Greenhouse Gas Initiative (RGGI), a mandatory programme capping power plant CO₂ emissions in 10 north-eastern states, permit volumes exchanged slumped to 36 million metric tonnes in the third quarter of 2010, down from 329Mt in the same period of 2009 (Bloomberg New Energy Finance 2009). However, in addition to regulatory uncertainty, carbon markets have flaws (Dag Hammarskjöld Institute 2009). Within the UNFCCC system key issues are the credibility of offsets from industrial gas projects under the CDM and the surplus in emissions allowances held by former Soviet countries. However, the EU seems determined to continue with its own scheme. The potential for evolution of the EU ETS system is explored in the final section of this chapter. It is noteworthy that in the first three years of trading, emissions in Europe were estimated to have been reduced by around 120 to 300 million tonnes (Pew Center on Global Climate Change 2008).

New initiatives such as the UK's Green Investment Bank are also providing potential foundations for more co-financing and risk sharing between the private banking sector and public entities (see Box 4).

Low carbon transport

Measurement of finance flowing into low carbon transport is challenging. The measures required for increasing financial flows in this sector are different in developed and developing countries. In developed countries low carbon solutions would need to be grafted on to existing transport networks.

In the UK for example, two-thirds of GHG emissions savings under road transport would come from more efficient and low carbon vehicles, particularly electric/plug-in hybrid vehicles (Parliament Committee on Climate Change, UK 2010). Given the current state of electric car technology, to develop an electric car market would only require



Box 4: Green Investment Bank, UK

In 2010, the UK government announced that it would create a £ 1 billion Green Investment Bank (GIB) that would make direct financial interventions to help the government meet its ambitions for green infrastructure. Although at the time of writing the specific governance structure of the GIB were still unpublished, it is expected to have a mandate to deliver and debt products, and share the risk in financing green infrastructure where the market on its own currently cannot adequately accommodate such a risk. Areas of investment are expected to include the offshore wind sector and the carbon capture and storage (CCS) industry. The UK government is also reported to be examining types of de-risking products for construction and operating phases to help the private sector introduce cheaper forms of low- risk capital. As well as reducing risk to mobilise additional capital in the market, the GIB will also seek to make a return on investment and to reinvest the proceeds into further green infrastructure financing. It has also been suggested that the GIB take a role in developing marketplace standards for green bonds by creating environmental integrity standards that would increase the product's credibility with institutional investors.

transitional financial support from government for car purchase and investment in a battery recharging network. The battery charging infrastructure could be a largely home-based network and would enable 240,000 electric cars to be on the road in the UK by 2015, rising to 1.7 million by 2020.

This is similar to the Japanese government's objective to achieve a 15 to 20 per cent market share of electric and plug-in hybrid cars by 2020. Once the electric/plug-in hybrid vehicle penetration is at these levels, it is likely that the private sector finance could be relied on to complete the conversion.

However, in developing countries, there may be an opportunity to avoid the private car centred model of transport and provide sustainable, high quality mass transport sooner, and at less cost (Sakamoto, Dalkmann, and Palmer 2010). Public finance is, and will remain, the core source of funds, using both domestic and international flows, such as ODA and export credits.

Improved waste management

Sustainable waste management is a major issue in human society and a growing source of efficiency savings in industrial management. Around 4 billion tonnes of waste are produced around the world each year of which scarcely one-quarter is thought to be recovered or recycled, including many secondary materials that can substitute for raw materials that are becoming increasingly scarce (Veolia Environmental Services 2009).

From being primarily a local activity, the scale of sustainable waste operations has mushroomed with the emergence of worldwide markets for a number of secondary materials, such as scrap and paper, for which 2007 and 2008 revenues matched those for raw materials, such as steel and paper pulp. This industry for industrial, municipal, and hazardous waste is served by a range of public municipal agencies and private sector enterprises. Together with the other economic activities associated with waste, from collection to recycling, it would appear to represent a world market of some € 300 billion, shared about evenly between municipal waste, and industrial and construction waste.

Finally, institutional investors are also playing a part. For example, former US President Bill Clinton has announced an investor-led survey of how companies use and track plastic in their businesses. Investors with more than US\$ 5 trillion in assets under management (AUM) are to back the Plastic Disclosure Project (PDP). The first PDP survey is scheduled for the first half of 2011 (McCabe 2010) and, as suggested by its name, is similar to the successful Carbon Disclosure Project, which sends out a detailed questionnaire to firms on their carbon emissions, targets and mitigation strategies.

Improved freshwater provision

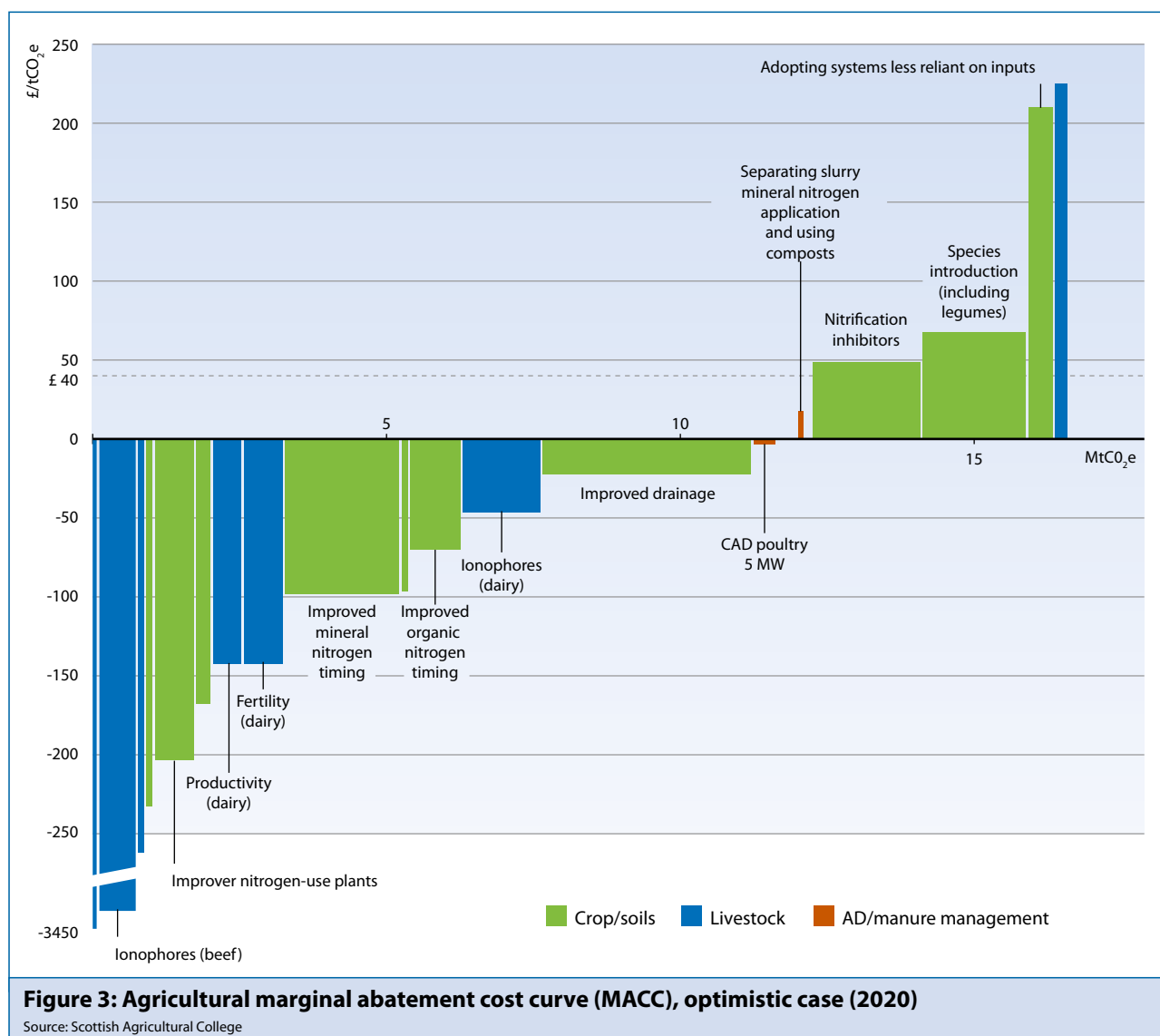
While public water companies provide most water and wastewater services worldwide, the number of people served by private water companies has grown significantly in the last two decades. As water infrastructure is very capital-intensive, private sector investment or support for public investment via bonds financed by investors is increasingly important. Private financing for infrastructure to produce freshwater is one area of potential significance for a green economy.

Currently, 95 per cent of global potable water is financed and provided by the public sector (OECD 2004). However, limited renewable freshwater resources and greater human water withdrawals are increasingly causing water stress and severe scarcity. About 2.8 billion people (UN MDGs 2008) endure some form of water scarcity of which 1.2 billion live under conditions of physical water scarcity and 1.6 billion people live in areas of economic water scarcity, where the costs of water provision have been rising. New infrastructure and improved water treatment technologies are central in improving water supply and wastewater management. The Camdessus Panel (World Water Council 2003) estimated the funding gap in the water sector for developing countries and emerging markets alone to amount to US\$ 100 billion per year — the bulk of which is for household sanitation, wastewater treatment, treatment of industrial effluents, irrigation and multipurpose schemes. Private finance would have to at least double to close the public investment gap in the water sector.

Sustainable agriculture

Until recently, agriculture has been ignored by financial market participants focused on sustainability. However, global demand for agricultural commodities is now pressing on supply and high-tech has entered the agricultural laboratories. It has also become clear that farming is a highly polluting industry and poses significant equity issues. The perception that agriculture is now a potentially risky, but profitable, opportunity has begun to attract the attention of the sustainability component of the finance sector. This report is unable to offer any reliable global estimates of green finance currently flowing into sustainable agriculture as a whole. However, the examples of responsible finance for palm oil and GHG reduction in the UK may be illustrative.

Global production of palm oil has doubled over the last decade to over 36 million metric tonnes per year and is expected to double again by 2020. In 2008, when prices were especially high, the market in crude palm oil was worth more than US\$ 25 billion. About 80 per cent is used for food, for example, margarine (WWF International and Profundo 2008). Sustainable palm oil production can help to meet the world's growing demand for edible oils and generate income and employment for rural economies in tropical regions.



However, unsustainable practices in parts of the industry have had serious impacts, such as forest clearances that destroy rich natural ecosystems and release huge volumes of GHGs into the atmosphere. There have also been social issues such as native communities being unwillingly dispossessed of their land. Because such problems may entail the risk of financial penalties, client default and reputation risk, many commercial banks have strengthened their risk assessment policies on palm oil loans, and have developed written policy statements on palm oil, noting that a responsible palm oil policy needs to cover the full range of companies involved in the palm oil sector, including upstream companies as the producers of crude palm oil and downstream companies involved in refining, trading and use of palm oil products.

In most OECD countries, the GHGs emitted by the agricultural sector are significant and comprise mainly of methane and nitrous oxide, which interact with soil and microbial processes in ways that are not completely understood (Climate Change Task Force UK 2010).

Also, the actors are many, dispersed and small, so that measuring emissions and enforcing regulations are not easy. Thus, increasing attention is being given to market-based instruments such as tradable emission permits. To that end, the UK has developed a Marginal Abatement Cost Curve (MACC) for UK agriculture (see Figure 3).

This exercise identified a technical potential of 9 MtCO₂-eq (metric tonnes of carbon dioxide equivalent) that could be abated at negative cost (i.e. this would save money for farmers under the assumptions used in the MACC), with an additional 4 Mt CO₂-eq below £ 40/t CO₂-eq. This indicates a scenario for GHGs policy, characterised by taxes and subsidies or a cap-and-trade scheme, with up to 6 Mt CO₂-eq potentially available for abatement by 2020 (Climate Change Task Force UK 2010), a market of over € 100 million. Because the biggest reductions may come from the least efficient and least aware operators, linking environmental performance to improved profitability is likely to be effective and should also prove to be an attractive business model for financial institutions.

4 Opportunities and challenges in financing the green economy

Section 2 showed that current financial flows into a green economy need to be dramatically scaled up while Section 3 showed that innovative financial mechanisms have emerged for many environmental and natural resource areas and have begun to channel funds to them. This section identifies some of the key barriers to scaling up these flows throughout the typical life cycle of investments from pre-investment to final exit, and suggests ways to remove them.

4.1 Addressing the full cost of externalities

If the costs of environmental degradation and social harm remain external to the costs of business and investment activity, then the risk/reward equation that underpins so much of financial services and investment activity will continue to promote environmentally and socially unsustainable business practices and financial activity. For most of the period in which a formal investment industry has evolved over the past 200 years, ESG issues were not considered in the investment policy-making and decision-making processes of most mainstream financial institutions.

One of the primary reasons for this omission was that externalities – costs that are external to a company's balance sheet such as pollution or destruction of ecosystem services – have simply not been assessed, priced or accounted for in traditional market activity and the associated investment processes that have supported that activity. Analysis in the recent TEEB business report (TEEB for Business 2010) confirmed that standard business valuation techniques for most part still fail to capture the values of basic ecosystem services. In addition, criteria employed in accounting to ensure relevant and reliable financial reporting are framed in a way that typically excludes intangible issues such as impacts and dependencies on ecosystems and biodiversity.

The failure to internalise the wide and diverse range of environmental and social externalities prevents larger amounts of capital flowing into a green economy. While governments, through their regulatory activities (direct regulation, environmental taxes, user charges, and tradable permit systems) and budgetary activities (payment for environmental services) will play a major

role to address these externalities, voluntary initiatives within the financial and investment sectors can contribute also. While externalities remain unaccounted for in investment activity, the risk/reward equation that underpins most capital market activity makes the dramatic scaling up of financial flows to a green economy infeasible in the short-term. In recent years, however, some of the world's largest investors have begun to focus on the questions of fiduciary responsibility and fiduciary legal issues in the context of ESG matters (see Box 5). In particular, it is in the interests of large, diversified institutional investors that own a fairly representative sample of the global economy – so called universal owners – to act to reduce negative externalities (see Box 6). While interest around the universal ownership theory continues to grow, it has yet to attain mainstream status and there are some dissenting views with respect to the overall thesis.

Most recently, there have been attempts to put a price on the damage caused by business to human health, the degradation of ecosystems, and the depletion of natural resources. Avoiding these costs represents one of the main benefits to society from greening the economy. For example, UN-backed research found that the human use of environmental goods and services in 2008 caused an estimated US\$ 6.6 trillion in environmental costs, equal to 11 per cent of the global economy (UNEP FI and PRI 2010). As the economic perils of a broad range of the “slow failures” or “creeping risk” (WEF 2010b) become more apparent, there is an accelerating need for capital markets and financial institutions to understand how natural and social value at risk will impact their investments in both the short and long-term.

A strategic commitment to capture these values and incorporate their consideration in internal decision making can help pave the way for greater capital flows to a green economy. Focused public policy action will speed up this process. The need to understand natural and social value at risk and its implications for economies poses a series of complex questions for the financial services sector, as well as for the broader business community. These questions are crucial for those parts of the financial system, such as the pensions and investment sector, which need to protect and grow assets over the long term.

Box 5: Financial materiality and fiduciary responsibility (KfW Symposium 2008)

In 2003, a group of asset managers (UNEP FI AMWG 2004-2009) collectively representing US\$ 1.7 trillion in AUM began to reconsider the financial materiality of a range of ESG issues that until then had traditionally been overlooked or undervalued by many investment approaches. Over subsequent years, the process yielded three major reports that have transformed thinking within the investment world.

In the Materiality Series (UNEP FI Materiality Series 2004 to 2010) mainstream financial analysts explored the relevance of a range of ESG issues, such as climate change, occupational and public health, human labour and political rights, and both corporate trust and governance, across a range of commercial and industrial sectors. The sectors included aviation, the auto industry, aerospace and defence, chemicals, food and beverage, forest products, media, non-life insurance, pharmaceuticals, property, and utilities. What the Materiality Series was so effective in doing was to hold the coming-out ball for the idea that ESG (particularly environmental and social) factors have financial relevance, and are as useful in constructing a synthesis of management quality as strictly financial factors.

The Materiality Series also helped lay the groundwork for the development of the PRI, now backed by more than 900 institutional investors representing US\$ 25 trillion in assets⁴. The third and, to date, final report in the series focused on climate change and was published just two months ahead of the December 2009 United Nations Climate Change Conference in Copenhagen. The report mainly takes the form of a review of key financial analyst research on climate change.

Along with the growing acceptance of the financial materiality of ESG issues, parallel work was undertaken to show that considering ESG issues in investment policy making and decision making was consistent with legal frameworks that govern the fiduciary duty of many institutional investors to act

in the best interests of their beneficiaries. In October

2005, a landmark legal interpretation covering the nine major capital market jurisdictions opened up a new potential for the world's largest institutional investors to consider ESG issues in their investment processes (UNEP FI and Freshfields Bruckhaus Deringer 2005). In fact, the interpretation argued that the appropriate consideration of ESG issues – from both risk and reward standpoints – was an obligation in most major capital market jurisdictions and mandated by law in some. The Freshfields Report greatly strengthened the case within the investment industry around the need for investors to fully integrate material ESG considerations in all aspects of their investment processes. In short, this work moved the discussion forward on the need for key market actors to integrate, account for and price the risks associated with a broader range of externalities than had previously been the case in investment practice. The Freshfields legal interpretation was followed in 2009 by the Fiduciary II (UNEP FI 2009) report that built on the initial interpretation. The Fiduciary II report concludes that ESG issues should be embedded in the legal contract between asset owners and asset managers, with the implementation of this framework being governed via ESG-inclusive reporting to asset owners. It also makes a case that advisors to institutional investors, such as asset managers and investment consultants, have a duty to proactively raise ESG issues with their clients, and that those who do not open themselves to potential legal liabilities. Finally, the study argues that responsible investment should be the default position for all investment arrangements. To achieve this the fiduciary duty should be aligned better with environmental and social dimensions. This evolving process that seen ESG issues being embedded in the thinking around fiduciary responsibility and legal considerations goes to the very heart of many investment policy making and decision making processes.

4.2 Providing pre-investment finance

At least 83 countries now have some type of policy designed to promote sustainable energy, but only a few have seen scaled-up investment in renewable energy

and energy efficiency operations (REN21 2010). Analysis suggests that one of the most important barriers to scaling up is the lack of pre-investment finance. Figure 4 demonstrates the phases of investment, from public grants, VC funding, and production subsidies required to develop a new renewable energy technology to the point that it can begin to demonstrate a track record and attract second stage funding. Figure 5 shows the private

4. The Principles for Responsible Investment (PRI), launched in April 2006, is an investor initiative backed by United Nations Environment Programme Finance Initiative and the UN Global Compact. www.unpri.org

financing mechanisms used to address financing gaps, which might be through an Initial Public Offering (IPO) or project finance loans from banks. The term “Valley of Death” is often used during the phase discussed above to describe the difficulties of accessing commercial finance between the initial VC investment and the demonstration, or from demonstration to commercial rollout with secondary VC investment.

The diagrams show where public grants or specific subsidies are essential. One can conclude that the private sector is capable of providing finance in more mature stages of commercial development, but is less reliable for early-stage finance where VC/PE operates. It demonstrates the need for a potential sharing of risk at the initial stages between private and public investors, for example, by providing incentives for private investment in the early deployment of new technologies or by improving the capacity of the insurance market.

Box 6: The universal owner theory explained

The universal owner theory (UOT) concerns a solution to an important contradiction in the investment system: short-term rewards for some are potentially available where externalities, such as climate change, ecosystems destruction or ignoring the rule of law) are not adequately accounted for. However, in the longer term these externalities may undermine the value of investments for all. Emerging work around the UOT is deepening our understanding and starting to quantify the economic, financial and investment implications of externalities along the investment chain.

A joint UNEP FI/PRI report on the subject estimated that the equivalent of US\$ 6.6 trillion of damage was externalised in 2008, or 11 per cent of the value of the US\$ 60 trillion global economy (UNEP FI and PRI 2010). Without action, the cost of environmental and social externalities relative to the value of the global economy is projected to increase by 62 per cent from 2008 to 2050. If environmental externalities are not addressed, the damage incurred annually continues over time and accumulates. The study also found that companies in the MSCI All Country Index are associated with over US\$ 1 trillion in environmental externality costs annually. This equates to 5.6 per cent of the market capitalisation of companies in the Index, and 56 per cent of their earnings. Environmental externalities could present a financial risk to universal owners invested in equity markets.

Source: UNEP FI/PRI (2010)

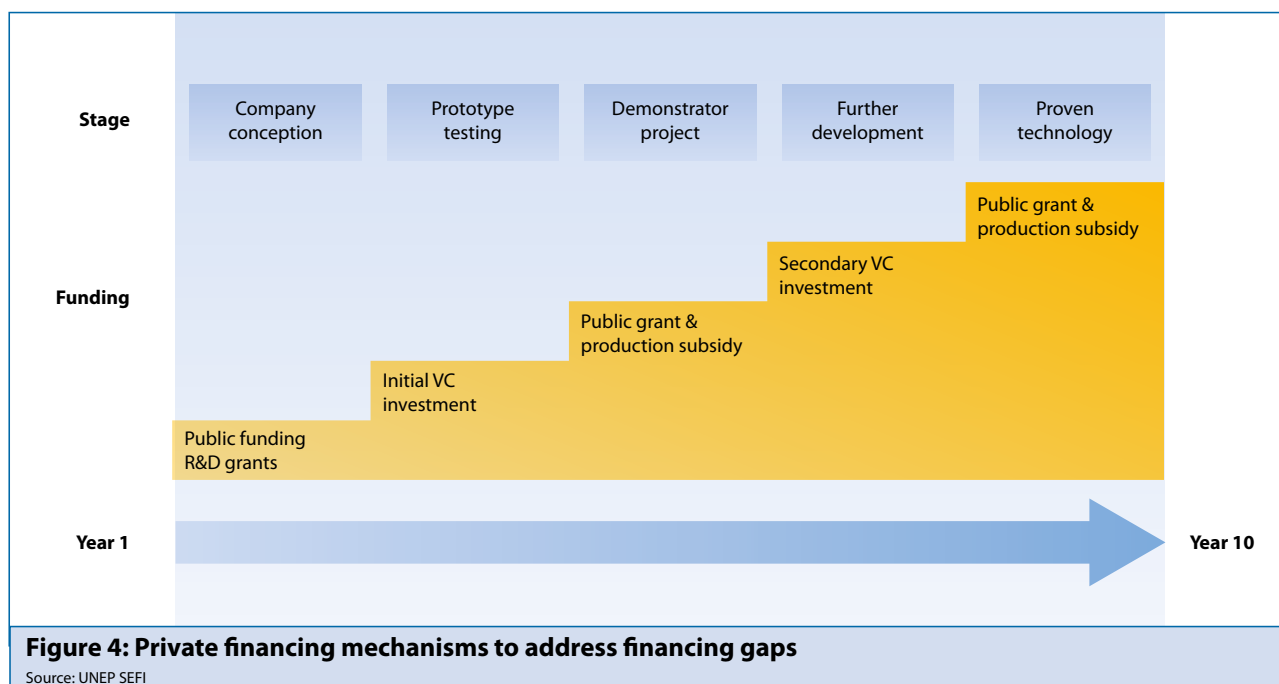
4.3 Integrating ESG risks into financial and investment decision making

To date, the degree to which ESG risks are factored explicitly into banking considerations is limited, largely due to the difficulties in establishing the financial materiality of such risks. Although public policy shifts have set processes in motion to strengthen the financial materiality of a range of these risks (see Box 7), there is a significant lag between a clear reflection of such risks in public policy at global, regional and national levels and its integration into the inner workings of the financial system. For the banking sector, this particularly relates to understanding and quantifying the credit risk, for example, linked to the likelihood of new regulation, and default implications of these emerging risks as well as the negative impact on collateral.

Also, the speed with which financial institutions are able to transfer risk into the system by removing the liability from their own balance sheet is an important factor in the assessment of how these emerging risks impact banking operations and the degree to which they are financially material for individual institutions. A 2006 report (UNEP FI and EcoSecurities 2006) concludes that in many cases for North American banks there was no link between bank lending and climate change risks because of the short average maturity of such loans and the speed with which banks transferred loans off their own balance sheet.

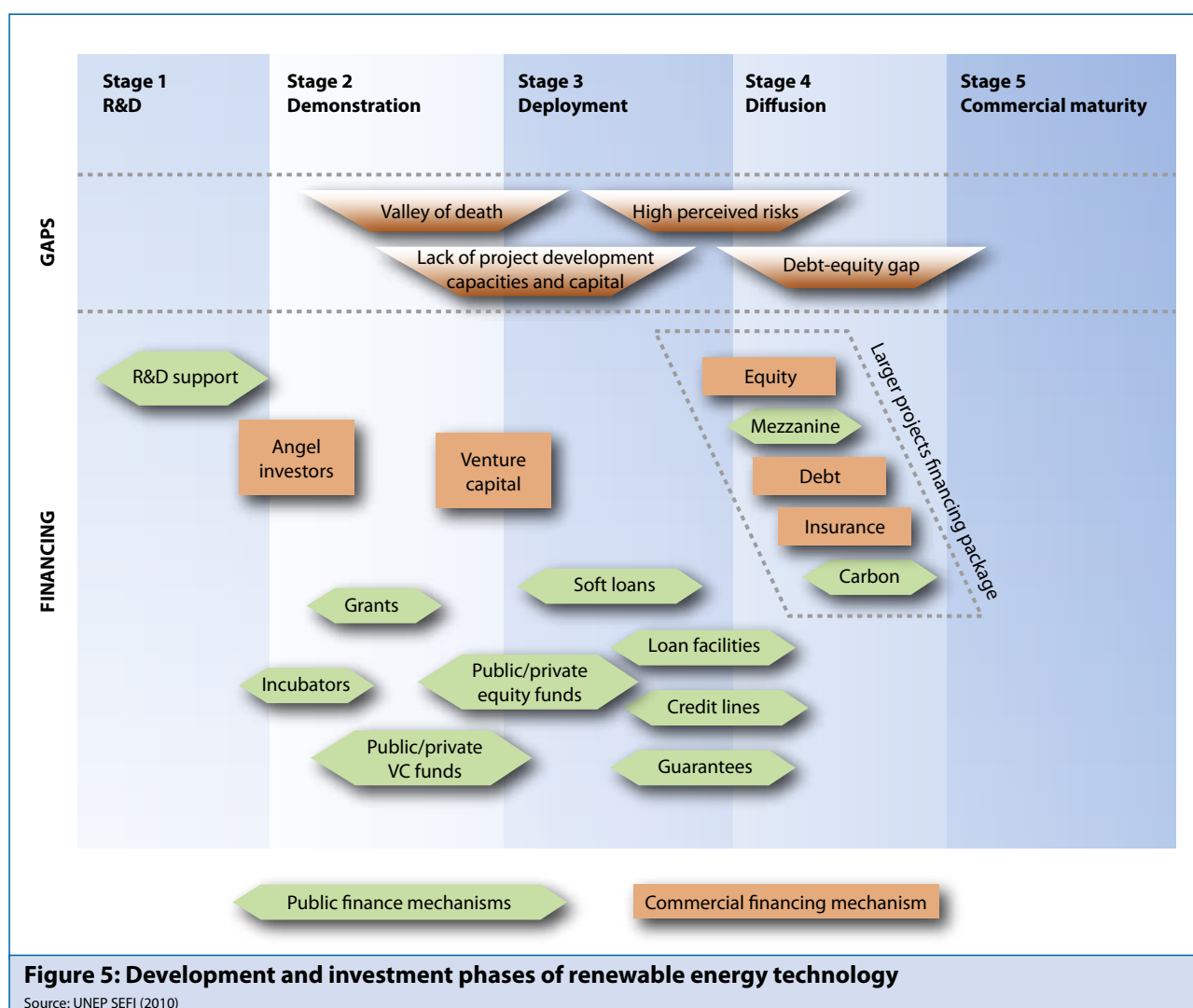
If the information that investors receive is shallow and short-term then their investment decisions can show similar characteristics, which is why the finance and investment community is demanding more data on ESG issues such as carbon emissions from the entities in which they invest. This type of sustainability/ESG reporting (hereafter “sustainability reporting”) has grown exponentially in recent years, for example, the GRI Financial Services Sector Supplement and Equator Principles. However, methodologies and international norms can still be improved. There are now significant moves towards more integrated reporting. To that end, in July 2010 the International Integrated Reporting Committee (IIRC) was formed to try and create a globally accepted framework for accounting for sustainability – a framework that brings together financial and ESG information in a clear, concise, consistent and comparable format. This issue is also being discussed by global stock exchanges.

However, the link between improved accounting and reporting and actual business practices is somewhat weak. Some 1,100 financial institutions (UNEP FI and PRI) now support United Nations -backed principles and statements that advocate firm steps towards a sustainable financial system and a responsible approach to investment, but progress in putting these statements into practice can be inconsistent and, in many cases,



embryonic. As stated earlier in this chapter, over 900 investment organisations managing more than US\$ 25 trillion of assets have now signed the PRI. The results of the PRI's annual assessment survey shows that US\$ 6.7

trillion of the PRI signatories actively managed assets, accounting impressively for some 51 per cent of such assets managed by PRI supporters, were subject to ESG integration in 2009. However, this represents only



around 7 per cent of the overall market of institutionally managed assets (PRI 2010).

Although progress remains slow, there is also evidence in the PRI's Annual Assessment Survey of how the asset owners that lead this initiative are catalysing change throughout the investment chain. For example, 87 per cent of the investment managers that participated in the survey now have an overall investment policy that addresses ESG issues, and 66 per cent of asset owner signatories now put specific ESG considerations into their contracts with managers and investment advisors.

The banking sector has also shown positive signs of reform. In the late spring of 2010, the sector was warned that post crisis, "private players will be held accountable to new and stricter standards of economic integrity and prudent management" (Trichet 2010). An international body, the Basel Committee on Banking Supervision (BCBS), part of the Bank for International Settlements (BIS)⁵, plays a key role internationally to define the rules

5. The Bank for International Settlements was established 17 May 1930, and is the world's oldest international financial organization. The BIS fosters international monetary and financial cooperation and serves as a bank for central banks. <http://www.bis.org/about/index.htm>

governing how banks handle risk to bolster the stability and resilience of the financial system, while ensuring sufficient lending to foster economic growth. The executive summary of the BCBS's consultative document – Basel III – on major banking reforms states, "A strong and resilient banking system is the foundation for sustainable economic growth, as banks are at the centre of the credit intermediation process between savers and investors" (BCBS 2009).

Moreover, banks provide critical services to consumers, small and medium-sized enterprises, large corporate firms and governments who rely on them to conduct their daily business, both at a domestic and international level. Considering a broader range of environmental and social risks into banking processes and disciplines such as those governed by the BCBS would have profound implications for the banking sector and would catalyse the transition to a green economy.

4.4 Expanding green insurance

The insurance industry is uniquely placed in our economies as a private market mechanism for the

Box 7: Banking risks around climate change

As carbon liabilities become internalised within accounting and financial systems, banks will be affected increasingly both directly through impacts on the value of their own capital and indirectly through changes to the value and risk profiles of the loan portfolios of institutions and the collateral held against those loans. Climate change creates concerns at the macro prudential level in terms of its long-term systemic risks that jeopardise whole regions, economies and industries.

Climate change also creates concerns at the micro prudential level in terms of risks embedded in the financing and investment undertaken by banks. The policy, legislative and regulatory changes underway in many countries to more fully account for a broader range of ESG risks will also strengthen the fiduciary duty (UNEP FI AMWG 2009) and fiduciary legal (UNEP FI & Freshfields Bruckhaus Deringer 2005) arguments that call for a full and proactive effort to integrate financially material risks in all aspects of investment policy making and investment decision making.

These changes have implications for banks, as well as the many other forms of financial intermediaries that exist along the investment chain. In previous guidance, the BCBS has sought to "promote a more forward-looking

approach to capital supervision, one that encourages banks to identify the risks they may face, today and in the future, and to develop or improve their ability to manage those risks" (UNEP FI AMWG 2009). It is in this forward looking perspective where full consideration by the BCBS of financially material ESG issues are required, such as the risks posed by climate change, resource scarcity and the destruction of ecosystems, as well as governance issues related to micro and macro prudential regulation. Aligning Basel regulations and standards with ESG issues carries the promise of a stable, resilient and robust financial system that can deliver capital for green projects and initiative.

Including a full range of ESG considerations in the capital, adequacy requirements of banks will be a significant step to align the worldwide banking system with the needs of a future green economy. Post crisis, and following criticisms that the Basel II framework was ineffective, the BCBS, under a G20 mandate from the Financial Stability Board (FSB) is in the vanguard of efforts to reassess the resilience of the banking system. To this end, a review of many of the key supervisory requirements was initiated in 2009. The opportunity to reinforce the importance of ESG issues into ongoing Basel Committee considerations remains current as the standards-setting pursues well into the next two years.

sharing of risk, with the global pooling of what would be risks otherwise borne solely by individuals and entities estimated at roughly US\$ 400 trillion (UNEP FI IWG 2009). As this risk pooling is integral to the efficient functioning of markets, economies and societies, the insurance industry is a key focus of regulators and policy makers. The risk pooling afforded is only possible with investors' willingness to put capital at risk; hence, value creation is necessary for its continued existence. The convergence of public and private interests in the insurance industry is nowhere more apparent than in the risks and opportunities presented by ESG issues.

The insurance – including reinsurance – community, with its expertise in assessing, pricing and managing risk and freeing the flow of risk capital, can play a critical role to support the emergence of a green economy agenda across business, industry and the markets. It is important to understand that insurance is not only a risk transfer mechanism to compensate financial losses, but also a risk management mechanism because insurers carry out loss prevention and loss mitigation measures in conducting their business. The insurance industry, therefore, has an unparalleled capacity to understand and engineer approaches and mechanisms to manage emerging ESG risks.

As such, the industry is a strong lever for the transition to a green economy due to its size, the extent of its reach into the community and the significant role it plays in the economy, not only in the risk management and risk transfer spheres, but also as an investor through the vast pool of insurance company reserves. In 2008, worldwide premium volume for life and non-life insurance business combined exceeded (Swiss Re 2009) US\$ 4.2 trillion, making insurance the largest industry in the global economy. The industry's global AUM in 2010 stood at US\$ 24.6 trillion (TheCityUK 2011). Table 6 highlights the premium make-up of the global insurance industry in 2008, and also gives an indication of the insurance gap between developed and developing regions.

The insurance industry has long been in the vanguard of understanding and managing risk, and has served as an important early warning system for society by amplifying risk signals. For example, the insurance and reinsurance community were amongst the first financial service organisations to engage in and explain the long-term economic risks posed by climate change (UNEP FI 1995). In addition to the threats posed by global warming, insurers today are communicating strong risk signals stemming from a wide range of ESG issues such as biodiversity loss and ecosystem degradation, water scarcity, poverty, emerging manmade health risks, ageing populations, child labour and corruption (UNEP FI IWG 2007). Because certain risks are too large to be borne by an individual insurer, these risks are

spread across the industry in a complex risk-sharing system comprising of many players, with the underlying principle of "one for all, all for one" that has supported social and economic development throughout human history. Insurers, reinsurers and retrocessionaires, are all risk carriers, as they put capital at risk and ultimately pay claims. Insurance agents and insurance brokers provide services to insureds and insurers. Similarly, reinsurance brokers and reinsurance underwriting agents provide services to insurers, reinsurers and retrocessionaires. The common denominator for agents and brokers in the system is that they are all intermediaries who act as channels in spreading risks. There are other service providers, such as catastrophe model vendors, loss adjusters, and rating agencies, but they are not directly involved in the risk-sharing process.

Over the last two decades, the insurance industry has also witnessed the emergence of insurance-linked securities, such as catastrophe bonds, where risk carriers have transferred peak risks in their portfolios to the capital markets by securitising, for example, their accumulated risk exposure in a specific territory due to natural hazards. Through loss prevention and mitigation, carrying risks, and as major investors, the insurance industry has protected society, catalysed finance and investments, shaped markets and underpinned economic development. However, the importance of the insurance industry as a driver of a green economy is poorly understood by policy makers, the broader business community and the wider public.

Uniquely positioned to understand the fundamental nature of emerging risks to communities, the global economy, whole industry sectors and its own investments, the insurance industry is now starting to explore the commercial viability of conceiving, developing and rolling out new products and services that address global sustainability issues (UNEP FI IWG 2007). The insurance industry is also beginning to realise the potential of microinsurance – insurance for low-income people – as both a prime business opportunity and a powerful tool for financial inclusion and sustainable development. Potential new markets include insurance for emerging manmade health risks and the protection of natural resources, in particular, biodiversity and ecosystems (e.g. forests) and water. The insurance industry is also awakening to the fact that acting sustainably, as in the cases of internal resource efficiency and the recycling of damaged assets, saves money and is a concrete way of leading by example (see examples in Box 8).

Clearly, insurance companies are unique entities. Their insurance and investment operations are highly intricate systems, with many players and functions, creating an industry that is not readily or fully understood by many

Region	Premium volume (US\$ million)	Real growth	Share of world market (%)	Premiums as per cent of GDP (penetration)	Premiums per capita (US\$) (density)
America	1,450,749	-2.4	33.98	7.29	1,552.7
North America	1,345,816	-3.1	31.52	8.54	3,988.8
Latin America and Caribbean	104,933	8.4	2.46	2.53	175.8
Europe	1,753,200	-6.2	41.06	7.46	2,043.9
Western Europe	1,656,281	-6.9	38.79	8.33	3,209.2
Central and Eastern Europe	96,919	9.0	2.27	2.79	299.2
Asia	933,358	6.6	21.86	5.95	234.3
Japan and newly industrialised Asian economies	675,109	3.8	15.81	10.41	3,173.2
South and East Asia	229,036	16.3	5.36	3.20	65.5
Middle East and Central Asia	29,213	4.7	0.68	1.45	110.3
Oceania	77,716	8.6	1.82	7.02	2,271.9
Africa	54,713	4.9	1.28	3.57	55.6
World	4,269,737	-2.0	100.00	7.07	633.9
Industrialised countries	3,756,939	-3.4	87.99	8.81	3,655.4
Emerging markets	512,799	11.1	12.01	2.72	89.4
OECD	3,696,073	-3.2	86.56	8.32	3,015.2
G7	2,925,946	-4.4	68.53	8.96	3,930.2
EU, 27 countries	1,616,461	-6.7	37.86	8.28	3,061.3
NAFTA	1,364,839	-3.0	31.97	8.10	3,065.7
ASEAN	45,493	0.4	1.07	2.99	85.1

Table 6: World Insurance in 2008

Source: Swiss Re (2009)

Box 8: Insuring against the worst for the best

Drought is a major risk in Ethiopia where 85 per cent of the population is dependent on smallholder, rain-fed agriculture. Less than 0.5 per cent have insurance. Climate change is threatening agricultural output as rainfall becomes less predictable, and many run the risk of falling into debt or having to sell assets. The use of index-based weather insurance can significantly improve lives.

Through the Horn of Africa Risk Transfer for Adaptation project, Swiss Re has been working with Oxfam America and Columbia University to protect the rural poor against drought risk. The project engages farmers in community-led, locally-designed climate adaptation initiatives such as reforestation and crop irrigation projects, where they earn premiums by making and using compost, constructing water-harvesting structures, planting nitrogen-rich trees and vetiver grasses. This unique risk management approach has allowed rural households, many led by women, to benefit from

insurance. Since its launch in 2008, uptake has increased from 200 households in the first year to 1,300 in 2010. The project now covers five villages, two climatic zones, and four crop varieties.

HSBC Insurance's Green Insurance products in Brazil are linked to investment to preserve forests. For motor insurance, HSBC commits to preserving 88 m² of forest for five years; and for home insurance, 44 m² for the same period. The calculations are based on the environmental footprint of an automobile or residence during that period. HSBC has already invested nearly R\$ 8 million (US\$ 4.8 million) preserving 3,000 hectares of Atlantic Seaboard Rainforest, equivalent to roughly 4,800 soccer fields and about 1 per cent of remaining pristine Araucaria forest. The work is carried out with the NGO, Sociedade de Pesquisa em Vida Selvagem. Funds are disbursed to landowners, each receiving a monthly sum for areas to be preserved and a forestry management plan.

stakeholders. It is crucial for insurers to generate income from both sides of the house at all times – prudent and disciplined risk management, underwriting and investment management are key processes to sustain profitability and long-term value creation. ESG issues are relevant to both the insurance and investment sides as risks posed by ESG issues can undermine the solvency of an insurance company and the long-term economic health of the insurance industry and its partners, ranging from insureds – households, businesses, and governments – to the entities financed by insurance capital. Thus, it is imperative for insurers, regulators, and policy makers to collectively address ESG issues in the insurance industry.

The main reasons that adversely affect the insurability of risks can be classified as supply-side and demand-side barriers. The supply-side barriers include volatility in the occurrence of claims, particularly for weather-related insurance. This can be smoothed to some extent with reinsurance, but this raises the related barrier of inferior data quality. Poor data on climate change related hazards and exposures means that uncertainty is much greater and this makes the private insurance and reinsurance market less willing to participate in risk-

bearing. Geographical, economic and climate data tend to be poorer for developing countries and access to such information is often prohibitively costly.

There are also regulatory barriers. A balance needs to be found between regulatory control of the market to protect consumers and flexibility in managing insurance operations in response to a changing risk landscape. Overly rigid insurance regulations will deter private insurers or result in suboptimal insurance solutions. Also, it is important that public control of the risk management framework (land development, safety regime, etc.) is maintained. Equally important, regulators must set a reasonable standard of care for policyholders to avoid moral hazard, that is adopting very risky practices in the belief that regulators will restrict insurers' freedom to modify policy terms. A final difficulty is high administrative expenses, a major problem for policyholders with only few assets because conventional insurance products have relatively high overheads. Simplified products can help solve this.

Some demand-side barriers can be overcome by the private sector through time; others may need public sector intervention. The most significant is probably low

Box 9: Mobilising private investment into sustainable energy in India

India has the fifth largest installed renewable capacity in the world. In 2009, private investments of renewables in India amounted to US\$ 2.3 billion ranking India in the top ten G20 members, while VC/private equity financing stood at US\$ 100 million (Pew Charitable Trust and Clean Energy Economy 2010). This has been driven by a suite of policy measures at state and federal level that have included:

- ■ Clear short and medium-term targets have been identified for renewable energy and energy efficiency amounting to 14 GW of new renewable energy capacity by 2012, and an ambitious plan to install 20 GW of solar energy by 2022 (Pew Charitable Trust and Clean Energy Economy 2010), financed through a national system of gradually increasing renewable purchase obligations (RPO) for power utilities combined with gradually decreasing feed-in tariffs;

- Feed-in tariffs and tax allowances for solar photovoltaic (PV) and solar thermal power, supplemented with support for PV manufacturing in special economic zones (CERC website) have been implemented. These policies led to US\$ 18 billion in new solar PV manufacturing investment plans or proposals by private companies;

- A renewable portfolio standard for utilities has been set up, starting at 5 per cent in 2010, rising to 15 per cent in 2020. One state has already enforced penalties on utilities not complying with the standard;

- Nationwide energy conservation codes are in place for residential buildings, hotels, and hospitals with centralised hot water systems, requiring at least 20 per cent of water heating capacity from solar;

- The National Mission on Energy Efficiency (NMEF) will initiate trading in energy certificates for several industrial sectors. NMEF will have two funds one to provide guarantees to banks providing loans to energy efficiency projects and the other to support investments in the manufacturing of energy efficient products and provision on energy efficiency services. The trading scheme will potentially generate transactions close to US\$ 15 billion by 2015; and

- A coal tax of US\$ 1 per tonne was put in place in 2010 to feed the National Clean Energy Fund. India depends on coal for 66 per cent of its energy needs and this tax would generate annual revenue of US\$ 600 million.

Box 10: Microfinance, environmental and social risk management and sustainable opportunities

The Netherlands Development Finance Company (FMO) is one of the largest bilateral private sector development banks worldwide and has helped to finance and manage sustainable microfinance projects in countries such as Kenya, Nepal, Mongolia, Cambodia, and Bolivia.

For example, in Nepal, FMO has financed the Clean Energy Development Bank Ltd. (CEDB). CEDB is a Nepalese development bank that provides access to finance for small and medium-sized entrepreneurs in agriculture, industry, trade and other productive business. CEDB's key focus is to invest in clean energy through its innovative renewable energy products, including mini and medium-sized hydropower projects, as well as solar and biogas projects that provide rural communities with the sustainable electricity/energy that is so crucial for private sector development. CEDB also provides microfinance loans to individuals in rural areas through MFIs and its own branch networks.

Similarly, FMO has invested in K-Rep Bank, a Kenyan microfinance institution (MFI) involved in financing implementation of a broad range of programmes with environmental and social themes such as:

- Small piped community water and sanitation projects;
- Household rain harvesting/water storage tanks;
- Integrated solid waste management in urban informal settlements;

- Small hydro-power/community water supply;
 - Eco sanitation – pay-per-visit toilets in peri-urban areas;
 - Installation of solar lighting system for schools in the rural areas;
 - Wind powered systems for water pumping;
 - Household biogas; and
 - Use of composted manure in kitchen gardening.
- FMO provides an innovative MFI Sustainability

Guidance toolkit for all MFIs that wish to reduce environmental and social risks. FMO has also developed and introduced the mechanism of a sustainability pricing incentive, usually an interest reduction, as part of a loan agreement. As an example, FMO has agreed upon a pricing incentive with the El Salvadorian Federation of Credit Associations and Workers' Banks (Fedecredito). The trigger to award the interest reduction is the timely development and implementation of a portfolio-wide environmental and social risk management system across Fedecredito banks.

The implementation of practical environmental and social risk management measures within micro and SME finance and the success stories of specific MFI/SME sustainability financing demonstrate that MFIS and SME banks may substantively contribute to a green economy.

risk awareness, particularly in the case of low frequency, high severity events. In the case of catastrophe insurance, the introduction of compulsory catastrophe insurance by governments may be an important element in overcoming this problem. It is often stated that premiums are unaffordable. This may be a signal from the private insurance market that the risk is very high and unsustainable, there is great uncertainty, the scale of operations is too small, or more risk management by at-risk parties is needed.

The insurance industry has an unparalleled capacity to understand and engineer approaches and mechanisms to manage ESG risks as they emerge, and has served as an important early warning system for society by

amplifying risk signals. Steps towards improving risk knowledge, including perhaps better use of technology to measure risk accurately, and more consumer education to drive demand for sustainable insurance products, can help the insurance industry overcome the barriers and become a leader in mobilising financial flows to the green economy (PSI forthcoming).⁶

6. Principles for Sustainable Insurance Initiative (PSI) is a group of leading global insurance companies that are members of United Nations Environment Programme Finance Initiative are currently spearheading the Principles for Sustainable Insurance Initiative, which will establish a global best practice sustainability framework for the insurance business, and a global initiative of insurers tackling sustainability risks and opportunities. These principles will be launched at the 2012 UN Conference on Sustainable Development (Rio+20 Earth Summit).

4.5 Creating public-private mechanisms

The lack of adequate public financing is also an important barrier to increasing the flow of green investment. Public financing is justified by the positive externalities expected from a green economy and it can be important for leveraging private investment. For example, it has been established that US\$ 1 of public investment spent through a well-designed public finance mechanism (PFM) can leverage between US\$ 3 to US\$ 15 of private sector money (UNEP & Partners 2009). However, simply having one or several disparate policies in place is not enough to catalyse a fresh supply of capital at scale. The example from India (see Box 9) shows that an array of well-orchestrated policy instruments, mechanisms and responsive institutions are needed to catalyse finance along the innovation continuum.

In 2009, UNEP and its partners explored which types of PFMs could be effective in mobilising funds from the institutional investors into low carbon infrastructure, particularly in developing countries (UNEP & Partners 2009). Five key barriers were identified, together with remedial PFMs. A case was made that investment-grade policies to mobilize the private financial sector for the energy revolution needed to be ambitious (Chatham House 2009) and should:

- Adopt legally enforceable targets and schedules for the adoption of renewable energy on a rolling 15 year programme and within a framework for the stabilisation of global GHG emission concentrations;
- Refocus energy policy: adopt full-pricing for non-renewables in a progressive schedule; provide a tapered support programme for renewables, gradually eliminating subsidies; and simplify and clarify the regime for renewable energy projects and carbon finance;
- Align other policies, particularly transport, development, education with climate change policy;
- Keep key financial institution decision makers well-informed about climate change and renewable energy technologies; and

- Ensure that multilateral and national public sector financial institutions support the transfer of renewable technologies adequately (UNEP FI 2004).

4.6 Scaling up microfinance for a green economy

Opportunities for sustainable lending are also prevalent at the microlevel. In addition to its well-known success in helping to provide sustainable livelihoods and reduce poverty, microfinance has recently been extended to such areas as drinking water and sanitation and small-scale decentralised energy systems (see Box 10). Growing in maturity and tested by global economic crisis, the microfinance industry in recent years has seen higher intensity of credit and liquidity risks, along with greater competition, volatility and systems integrity issues as more financial intermediaries are involved. This underlines the need to move from crisis management to more systemic and comprehensive risk management systems as the industry matures. The experience also shows the importance of developing meaningful partnerships and alliances with organisations involved in the relevant industry, for example the agrifood, value chain (ADB 2008).

Microinsurance products provide the potential to help households, SMEs and other “micro agents” at local level to adapt to challenges such as climate change. For example, the first microlevel rainfall insurance in the world was launched in India in 2003, through close collaboration among BASIX, an Indian MFI (microfinance institution), the World Bank, and private insurers and reinsurers. The pilot scheme has been viewed as an impressive success because all the stakeholders gain: government by reduced relief payments and social problems, and easier budgeting; the insurer by fulfilling its social insurance quota; the MFI complements its client services and reduces the default rate on its loans; the poor farmers receive reliable protection for their income and assets; and overseas development agencies avoid disruption from emergency relief calls, and can claim speedier assistance for clients.

5 Greening global finance and investment: enabling conditions

5.1 Setting policy and regulatory frameworks

Regulatory frameworks across capital markets are critical to channel financial resources at scale towards a green economy. The gaps between high policy, national laws and a financial and capital market system that fully internalises green economic thinking, although narrowing, remain significant. The legislative, regulatory and quasi regulatory systems, including the supervisory bodies and credit rating agencies that govern financial services, are at best a work in progress and are at worst poorly designed and not fit-for-purpose for a green economy. These systems are important because they transmit green policy goals along the investment chain and into the processes of financial intermediation, and through them into the real economy. It is also important to note that there is a compressed timetable in which to create a policy framework to address these gaps. Climate change and resource scarcities are already starting to adversely impact social and economic development as well as environmental integrity. Annual economic losses associated with climate change and natural disasters topped US\$ 150 billion a year in 2005 (Munich RE 2009) and a credible scenario (UNEP FI CCWG 2007) has suggested that with BAU, a US\$ 1 trillion loss in a given year by 2040 is possible.

However, it is important to note that the formal linkages of financial and sustainability-focused policy making at the highest level are still relatively new. The first formal gathering of Finance Ministries to discuss climate change only took place in December 2007 in a meeting parallel to the United Nations climate summit in Bali, Indonesia, when Ministers or high-level financial policy makers from 38 countries gathered for two days. The convening in 2010 by UN Secretary General Ban Ki-moon of a High-Level Panel to explore the financing response to climate change is a much-welcomed development.

This section briefly sets out to describe some of the proposed standards and policy initiatives to help integrate non-traditional “creeping risks” such as climate change and resource scarcity into financial policy making. These include frameworks for enhanced environmental and social disclosure within the investment sector and codes for green lending and environmental liability.

It is clear that sound public policies and enabling regulatory frameworks are indispensable for freeing up the flow of private finance towards a green economy. The risk/reward equation still works unfavourably for would-be green investors. Governments should involve the private sector in establishing stable and coherent policy and regulatory frameworks that require the integration of environmental, social, and governance issues in financial policy making. In addition, governments and multilateral financial institutions should use their own resources to leverage the financial flow from the private sector towards the fledgling green economic opportunities.

5.2 Enhanced environmental and social disclosure

Investors demand full ESG disclosure from companies so that risks can be monitored. The same approach can be applied to the finance and investment practitioners. For example, this year 40 per cent of signatories to the PRI disclosed in full their annual assessment of how they are implementing responsible investment. The ground prepared by this voluntary initiative is now being closely examined by financial markets and regulators worldwide. The UK has introduced the Stewardship Code – a “comply or explain” code for institutional investors to report on their stewardship activities.

Guidance by the GRI and others on sustainability and integrated reporting provides an opportunity for both private and public financial institutions to disclose their management approach to a green economy agenda and report progress in applying ESG criteria. Combined with targeted stakeholder engagement, this can improve management’s ability to effectively consider the direct and indirect impacts and footprint of the services they provide. This requires building capacity in the use of recognised indicators and metrics for proper assessment, comparison and Finance benchmarking. Public and private banks could be encouraged to measure the net contribution of their activities to climate change, biodiversity loss and the green economy at large. Policies can be designed to improve their green efficiency, for example by examining and reporting the carbon and ecological footprint of their investment portfolios.

Related standards that can be linked with requirements for disclosure on progress include governance codes for stock exchanges, green lending and investing standards, green standards for SWFs, environmental liability standards, and mandatory endorsement of voluntary finance and investment codes. When such standards and progressive policy are combined the effects can be impressive, as is the case in the rapid progress of the green finance sector in China (see Box 11).

5.3 Supporting institutions and facilities

Policy frameworks also need to support institutions and facilities that can finance the transition to a Green Economy. Key areas of focus include market-based instrument (i.e. emissions trading schemes, payment for ecosystem services schemes, etc.) green bond markets,

listing rules and corporate ESG performance, the role of DFIs, greening sovereign wealth funds, and fiscal policies

Market-based instruments: Emissions trading schemes

Emissions trading schemes are still new to financial markets and early pilots such as the EU Emission Trading System (EU ETS) have proved useful, but need improvements if they are to be more effective. Domestic and international policies in both developed and developing countries need to ensure strong and sustained price signals on carbon emissions and create well-designed carbon markets that avoid an overabundance of permits or a lack of enforcement capacity.

Expanding and deepening the international carbon market will need to include greater clarity on the future interplay of the CDM, Joint Implementation projects, and emerging credit mechanisms such as Nationally

Box 11: Greening the finance sector in China

Chinese policy makers have in recent years introduced green credit guidance for the country's banking sector and environmental liability guidance for the insurance industry. China's leading banks are working to operationalise revised credit assessment systems across their main business lines. Also, the country's city-based commercial banks, rural banks and cooperatives are involved in greening the country's credit system. Similarly, 20 of the country's insurers are actively exploring new environmental liability insurance products and services, while a series of pilot environmental insurance initiatives have been carried out with a number of provincial and municipal authorities around the country.

The China Banking Regulatory Commission (CBRC) is tasked with regulating and supervising banks and non-bank financial institutions. In 2007, CBRC introduced Energy Conservation and Emission Reduction regulations requiring financial institutions to establish an organisational framework and internal procedures to advance green criteria. Among other things, the CBRC's regulations require a senior banker in each regulated institution to be responsible and accountable for green credit as well as to boost lending to the renewable energy and green sectors.

The CBRC sees two roles for the institutions it regulates. First, through lending to facilitate new energy sectors such as wind and solar. Second, by imposing restrictions on clients that are non-

compliant with environmental laws and regulations and by withdrawing existing lending in extreme cases. Banks are required to submit a report to CBRC annually to outline their advances in the area of green credit and in turn the regulator reports developments to the State Council. The CBRC encourages its regulated institutions to apply international protocols that support sustainability in financial services.

The role of international financial institutions in supporting the greening of the Chinese financial sector is important. For example, the Industrial Bank of China, Pudong Development Bank, and Beijing Commercial Bank have worked closely with the IFC to advance energy efficiency projects. The IFC provides guarantees and assists the banks in preparing for CDM projects. The Industrial Bank of China estimates that over two years the reduced CO₂ emissions from its energy efficiency projects is equivalent to the total emissions of the Beijing taxi fleet.

On the banking side, ICBC, the largest bank in the world by market capitalisation, has created a Green Credit Policies Department in an effort to become the leading green bank in China. In addition, the bank is active in disaster relief and rural education. On green credit, ICBC classifies clients into nine categories and has a colour coding system – black, green, red, and grey – to assess eligibility for credits.

Appropriate Mitigation Actions (NAMAs) and REDD+ (see Box 2).

Also, the different regional schemes must ensure consistency and comparability on how emissions and offsets are measured, verified and reported, and must avoid the growth of an opaque carbon derivatives market that might have harmful systemic consequences.

Under Phases I and II of the EU ETS, emissions allowances were distributed free, partly to avoid carbon leakage from industrial production relocating offshore. However, this led to windfall profits for some firms, and has been subject to gaming by heavy industry to ensure that the emissions caps were not too challenging. The consequence has been a rather low carbon price and a muted effect on emission levels themselves compared to what is deemed to be required.

However, the European system is evolving. In 2010, the European Commission worked to adopt decisions governing critical aspects of Phase III of the EU ETS for the period 2013 to 2020. These include the introduction and operation of an auctioning system for emission permits in mainstream sectors, as well as the amount and distribution of free allowances to sectors exposed to carbon leakage, i.e. competition from countries without emissions limits. There is also the prospect of revising the European emission reduction objective upwards from -20 per cent to -30 per cent by 2020, in line with the EU's objective of avoiding dangerous climate change, which is considered to be a temperature increase of 2°C (CDC Climate Research 2010).

Green bond markets

As discussed earlier in this chapter, the green bond market is growing rapidly. An increasing number of multilateral development banks are issuing these products, which are also being issued at the municipal level. There is also collaboration with the corporate sector. For example, in April 2010 the European Investment Bank (rated Moody's: Aaa/S&P: AAA) and Daiwa Securities Group announced a € 300 million issuance of Climate Awareness Bonds to finance the bank's future lending projects in the fields of renewable energy and energy efficiency.

Clearly, policy frameworks need to be flexible enough to support the differing ideas emerging and the scale required. If green bonds are to reach the scale required to finance a transition to a green economy, then they run the risk of endangering the AAA ratings of the multilateral development banks that issue them. These institutions can only raise so much additional debt before it could affect their credit rating, which is preciously guarded by their treasury departments. This is also true of developed countries, especially in light of recent very high deficits and consequent heavy borrowings during the financial crisis.

Bond issues in the hundreds of millions and even low billions are within a scale that should not present fundamental problems. However, consideration of the tens or hundreds of billions of bond issues needed in the green scale-up are a different matter. This issue needs to be addressed by policy makers and regulators. To some extent, it will be mitigated by improvements in the global economy and as governments and financial institutions worldwide repair their balance sheets.

Local institutions may also need human capital support in moving to the needed scale. Given the risk taken on by bond issuers and the need to get low-cost capital flowing, the question is who is best placed to make quick and good decisions to put capital to work in green investments that earn adequate returns. To help close the "green gap", much lower cost-of-capital debt ultimately needs to be available to the sponsors and developers of green projects. This likely means it needs to be channelled through local financial institutions in the developing countries where these projects exist. This needs to occur efficiently and with as little as possible lost in carrying costs charged by these intermediaries. Some argue for asset-backed and rated bonds to be issued directly by major project developers. This alternative may develop over time.

Listing rules and corporate ESG performance

As the central marketplaces between buyers and sellers of equity securities and other assets, exchanges can – and often do – play a key role in promoting enhanced corporate ESG disclosure and performance (World Federation of Exchanges 2009).

Globally, exchanges provide approximately 50 different sustainability indices, ranging from the generalist FTSE4Good Index to the specialised Deutsche Börse's DAXglobal® Alternative Energy index. Exchanges such as BM&FBovespa in Brazil, the Johannesburg Stock Exchange, and Bursa Malaysia also help to drive the availability of ESG information through corporate awareness raising, and integrated corporate governance guidelines. In several markets, such as South Africa, Malaysia and China, exchanges have worked with regulators to incorporate ESG disclosure requirements into listing rules and company law.

Exchanges that have taken such initiatives have so far had mixed results in terms of positive reinforcement from investors. In addition, companies often highlight the fact that mainstream investment analysts need to pay closer attention to ESG issues (UNEP FI and WBCSD 2010). Nevertheless, at a global level the quantity and quality of ESG disclosure by listed companies is highly variable and has significant gaps. There is growing pressure from some investors under the framework of the PRI to strengthen regulation on ESG disclosure. One

outcome of this, for example, is that in January 2010, the US SEC issued interpretive guidance on existing SEC disclosure requirements as they apply to business or legal developments relating to the issue of climate change. The following areas are examples of where climate change may trigger disclosure requirements::

■ **Impact of legislation and regulation (US SEC 2010):** When assessing potential disclosure obligations, a company should consider whether the impact of certain existing laws and regulations regarding climate change is material. In certain circumstances, a company should also evaluate the potential impact of pending legislation and regulation related to this topic;

■ **Impact of international accords:** A company should consider and disclose, when material, the risks or effects on its business of international accords and treaties relating to climate change;

■ **Indirect consequences of regulation or business trends:** Legal, technological, political, and scientific developments regarding climate change may create new opportunities or risks for companies. For instance, a company may face decreased demand for goods that produce significant GHG emissions or increased demand for goods that result in lower emissions than competing products. As such, a company should consider, for disclosure purposes, the actual or potential indirect consequences it may face due to climate change related regulatory or business trends; and

■ **Physical impacts of climate change:** Companies should also evaluate for disclosure purposes the actual and potential material impacts of environmental matters on their business.

Development finance institutions

Providing long-term public funding at home and abroad, Development Finance Institutions (DFIs) can play a significant role in supporting key elements of the emerging green economy. Issues such as climate change, energy security, and food security were a key consideration in the decision of shareholder governments to provide significant capital increases to the key multilateral development banks in 2010. DFI's include:

■ Multilateral DFIs such as the World Bank, the IFC, the Inter-American Development Bank, the ADB, the African Development Bank, the EBRD, and the EIB, which in 2009 were reported to have committed US\$ 168 billion (World Bank 2010b);

■ Bilateral DFIs, such as KfW group, which is German government-owned, with two subsidiaries focused on international development finance; AFD, a French

government-owned bank focused on developing and emerging countries and the French Overseas Communities; FMO, an entrepreneurial development bank founded by the Dutch government, targeting the private sector in developing countries; CDC, a UK government-owned institution, providing investment capital for business in particularly Sub-Saharan Africa and South Asia; and the Japan Bank for International Cooperation/ Japan International Cooperation Agency; and

■ National DFIs such as the Development Bank of Southern Africa, a South African government-owned bank focused on infrastructure development in South Africa and its sub-region; the Brazilian Development Bank, which is government-owned and finances development in Brazil and expansion of national companies abroad; the Caisse des Dépôts group, a public investor supporting the economic development of France; and the Overseas Private Investment Corporation, which is US government-owned and supports US business at home and abroad.

Some of these institutions belong to more than one category. For example, the KfW is both a major domestic financial institution and a strong international development bank. Within this group of banks, many provide loans, both concessional and non-concessional, to governments only. But a growing number fund sub-regional entities, state-owned corporations, and private sector businesses.

These Foreign Direct Investments (FDI) play a critical role in funding macroeconomic policies, sectoral policies, major infrastructure projects, and private sector development. Their contribution to greening national economies is already significant. They fund major sectors such as water, renewable energy, forestry, and agriculture. DFIs have been instrumental in mainstreaming microfinance and supporting the development of private industries in risky green sectors at early stages of development. But their role could be strengthened further, taking advantage of the prominent position they occupy in the funding of domestic investment programmes. Steps in this direction would include better identification of green economy aspects in their strategic targets, greater share of their activities devoted to these aspects, better measurement and reporting methodologies, improved cooperation among themselves, and sharing of best practices.

Governments are in a position to officially task these institutions to support green economy development, backed by concrete goals and targets. Carbon emissions reduction, access to water and sanitation, biodiversity promotion, etc., could become official goals for DFIs, in addition to poverty alleviation (UNDP 2007/2008) and infrastructure financing.

Development banks also have a major indirect or direct influence through the conditionalities they tie their funding to and through the due diligence they practice, for instance when they fund private corporations. They also provide technical assistance to public and private institutions. The three categories of institutions can collaborate in defining standard protocols for green due diligence, and work on standards and goals for sectors in which they have a major influence, such as municipal finance, transport, and energy. Domestic and some international DFIs play a major role in municipal finance and housing. These are two critical areas for the green economy: developing green practices for local municipalities and greening the housing sector, especially social housing.

The shareholders of the private sector dedicated DFIs, or the private sector arms of development banks, could consider promoting even further their traditional role in incubating and developing nascent green markets. Given the shortage of equity, a barrier even higher for green activities than access to credit, this could include additional support for cleantech private equity and green VC funds in developing countries. They could also play a greater role in further influencing the private banking sector, providing dedicated credit lines to green market activities at low interest rates and incentives for public and commercial banks to move their services towards green economy goals.

At the international level, some – such as the World Bank – focus solely on sovereign finance, which is

Box 12: Caisse des Dépôts and its long-term investment model

The group Caisse des Dépôts, a French public financial institution, is defined by law as a long-term investor serving the public interest and economic development. It has integrated ESG criteria upstream in its investment decision making process, as well as in its shareholder's activities through a constant dialogue with the companies listed on the stock exchange market in which it holds shares. The Caisse des Dépôts model is now widely recognised. A first global forum gathering the main public financial institutions comparable to Caisse des Dépôts was held in Morocco in early 2011 to examine the potential of this model to be replicated and address long-term economic needs.

What characterises long-term investors such as Caisse des Dépôts is their robust capital base, which enables them to absorb short-term financial fluctuations. As such, they are in a position to address green economy financing challenges from R&D to production. They can foster innovation by financing platforms that gather research centers and private companies in order to value technological breakthroughs in the fields of eco-innovation and renewable energies. Long-term investors also have the capacity to finance projects yielding revenues only as of five to ten10 years. Caisse des Dépôts has created such a platform and since

2008 is implementing a € 150 million investment plan in several fields, such as photovoltaic solar energy, biomass, windmills, and water power, to contribute to France's efforts to cut its GHG emissions by 20 per cent.

The bank has also joined forces with other long-term investors in the framework of the Long-Term

Investment Club and created with its partners – Cassa Depositi e Prestiti, KfW Bankengruppe, and the EIB – two investment funds in the infrastructure sector. One of them, the 2020 Marguerite fund for energy, climate change and infrastructures, is dedicated to the EU-27 zone and committed to invest in renewable energies for 35 to 45 per cent of the total size of the fund. The other, InfraMed, is focused on the Union for the Mediterranean zone. The management of both follow a philosophy of long-term investments, which means:

- The investments are stable for 20 years and no core sponsor may transfer its shares during the lock-up period of 10 years;
- The investments are stable for 20 years and no core sponsor may transfer its shares during the lock-up period of 10 years;
- The incentives of the advisory team are based on long-term performance criteria and are fully consistent with the general principles of long-term performance endorsed by the G20; and
- In terms of governance, a good balance between the interests of the investors and the autonomy of the advisory team is sought. For the InfraMed fund, strict ESG criteria are applied on the basis of the EIB requirements.

The experience of European long-term investors could serve as a basis for building up a doctrine for responsible public investment in the green economy.

lending and other support to governments. Others, like the IFC and the EBRD, are wholly or mainly concerned with private sector development in emerging markets, and invest on commercial terms. DFIs deploy a range of instruments including debt financing, equity investment, guarantees, and trade finance programmes. Multilateral development banks also leverage grant funding from donor governments or entities such as the GEF and provide technical assistance and advisory services.

The DFI community also includes long-term investors, such as the French CDC, the Italian CdP, Germany's KfW, and the Moroccan CDG, characterised by a low reliance on short-term market liquidity thanks to stable resources, often comprised of regulated or guaranteed deposits, long-term savings products or long-term borrowing. These institutions typically have a robust capital base, stemming mainly from reserve accumulation, which enables them to absorb short-term fluctuations in financial markets. As such they can invest in – often illiquid – capital or debt instruments that yield a profitable return in the long run, such as those issued by companies operating in sectors such as general interest utilities, infrastructures or renewable energies (see Box 12).

The World Bank's operations range from the integration of climate change issues into sectoral strategies to the management of specialised investment funds and raising capital for project finance through green bonds. In the private sector arena, the IFC provides a suite of finance and advisory services ranging from energy efficiency financing facilities for intermediation by local

banks, to support for low carbon investment indices and the issuance of green bonds. As a global fund dedicated to the environment, the GEF (see Box 13) provides funding to cover the incremental or additional costs associated with transforming a project with national benefits into one with global environmental benefits. Its Earth Fund targets private sector engagement through public private partnerships. Up to 2009, the GEF has invested US\$ 2.7 billion to support climate change mitigation projects in developing countries and economies in transition, and leveraged another US\$ 17.2 billion in project co-financing. With its longer term focus, it can provide critical support in scaling up green economy projects in areas such as climate, water, land, forest and chemicals management.

The EBRD's Sustainable Energy Initiative (SEI) has an investment target of € 3 billion to € 5 billion from 2009 to 2011, with a corresponding carbon reduction target of 25 to 35 million tonnes of CO₂ equivalent per annum. Amongst other activities, EBRD has emerged as the dominant investor in renewable energy in its region of operations – Central and Eastern Europe, and Central Asia – concentrating primarily on wind power. Like the World Bank Group, the EBRD has also begun to increase its focus on climate change adaptation by developing new tools to integrate adaptation risk into project due diligence and structuring, as well as financing infrastructure projects such as flood defence schemes. IFC, EBRD and other DFIs are also collaborating on protocols for GHG assessment and several of them report publicly on the annual emission reductions and emission increases associated with new projects signed each year.

Box 13: The Global Environment Facility (GEF)

The Global Environment Facility (GEF), the world's largest public environmental fund, provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. The GEF serves as a financial mechanism for the UN conventions on Biological Diversity, Climate Change, Persistent Organic Pollutants and Desertification. The GEF partners with ten intergovernmental agencies, including UNEP, UNDP and the World Bank as implementing agencies. The latter has also served as the Trustee of the GEF Trust Fund since 1994. Established in 1991, the GEF is today the largest funder of projects to improve the global environment. The GEF has

allocated US\$ 9.2 billion, supplemented by more than US\$ 40 billion in co-financing, for more than 2,700 projects in more than 165 developing countries and countries with economies in transition. Through its Small Grants Programme (SGP), the GEF has also made more than

12,000 small grants directly to nongovernmental and community organisations, totalling US\$ 495 million. Grants can be awarded up to a US\$ 50,000 ceiling with an average grant typically about US\$ 25,000 per project. The small grants network which has been designed to empower local communities make investment choices that have the multiple benefit of generating green jobs at home while protecting the global environment.

Development finance institutions can play a key role in incubating and developing nascent markets. They have been instrumental over the last decade in supporting microfinance to the extent that it is now a relatively mature asset class. Current activities in frontier sectors include support for cleantech private equity and VC funds in developing countries, and an increasing emphasis on solutions for poor consumers.

Greening sovereign wealth funds (SWFs)

The growth of state-owned investment funds willing to invest globally is relatively new, but already significant in its impact. While there are concerns about the growing influence of SWFs – such as their capacity for exploiting market inefficiencies and a lack of transparency – these funds can play a major role in financing the green economy transition.

Support should go towards helping SWFs to incorporate climate risk considerations directly and systematically into their actual stock selection and portfolio construction processes, as is the case with the example of the Norwegian Pension Fund Global (see Box 14). Suggestions such as the creation of mutual green funds

invested in by collaborating SWFs – such as Brazil's Amazon Fund launched in 2008 to solicit international donations to save the Amazon forest – are also worth considering.

Like pension funds, SWFs tend to have a long-term horizon. As a result, SWFs have a clear interest in improving the environmental performance of companies and other entities in which they invest, so as to enhance their long-term returns and better manage risk and reputation.

5.4 Fiscal policies

Green Economy fiscal policy options fall into five broad categories. These cover environmental tax reforms and instruments such as carbon taxes, tax exemptions and reductions; broader and robust pollution charges; green subsidies, grants and subsidised loans to reward environmental performance; removing environmentally harmful subsidies; and direct public expenditure on infrastructure. They can serve, among other things, to address high upfront investment costs. This smart

Box 14: Norwegian Pension Fund Global

The Norwegian Pension Fund Global, one of the largest SWFs in the world, has a broad ownership in approximately 8,400 companies worldwide. The fund is largely passively invested and holds an average ownership share of 1 per cent in each company it is invested in. The fund is a universal owner with a long investment horizon, and inherently has a clear financial interest in companies taking good corporate governance and environmental and social issues duly into account. Fiduciary responsibility for the fund also includes safeguarding widely shared ethical values. In the area of environmental issues, including climate change mitigation and adaptation, the fund employs the following tools:

Research

The Norwegian Ministry of Finance, acting as principal for the fund, currently participates in a climate change and strategic asset allocation research project between the investment consultancy Mercer and 13 other large international pension funds from Europe, North America, Asia, and Australia. A report from this project was published in February 2011.

Environmental investment programme

The Norwegian Finance Ministry has established a new investment programme for the fund that will

focus on environmental investment opportunities, such as climate-friendly energy, improving energy efficiency, CCS, water technology, and the management of waste and pollution. The investments will have a clear financial objective (Norwegian Ministry of Finance 2010). At the end of 2009, over NOK 7 billion had been invested under this programme, a faster escalation than originally assumed (Norwegian Ministry of Finance 2011).

Dialogue with companies

The pension fund's manager, Norges Bank through its asset management department Norges Bank Investment Management (NBIM), has set out its expectations on companies' climate change management. As a long-term investor, it is of vital importance that the fund is able to evaluate the degree to which a specific company is exposed to the risks and opportunities that arise from climate change, both in its direct operations and across its supply chain. NBIM considers companies' efficient adaptation to this transition to be a significant factor when protecting the financial assets of the fund, and expects companies to develop a well-defined climate change strategy.

combination can also be mutually reinforcing, for example, using taxes to reinforce the impact of other instruments such as standards and subsidies. In the field of building and construction (see the Buildings Chapter), tax credits can be used to boost green or energy-efficient development, and the renovation of investment property.

The cases of tax incentives and subsidies show that it is not simply about new incentives, but also about making sure that existing incentives do not support unsustainable activities. Some approaches and reforms are more difficult to implement than others. For example, the creation of green subsidies or removing environmentally harmful subsidies is often technically and politically difficult, especially when public finances are stretched and subsidy removal is thought to have adverse impacts on poor households. Also, the reality of the mainstream financial sector is that it remains wedded to serving the finance, investment and insurance needs of the brown economy and traditional infrastructure needs across heavy industry, power generation and transportation – a classic case of vested interests.

For example, it is estimated that the removal of the US\$ 500 billion in subsidies underpinning the fossil fuel sector globally could boost the global economy by around 0.3 per cent (UNEP 2010), a clear mid to long-term benefit for financial service institutions. Yet, in the short to mid-term, removing such subsidies fundamentally changes the risk/reward equation for the entire fossil fuel sector. Thus, their phase-in would need to be gradual and flanking measures put in place targeted on protecting the poor from potentially adverse impacts.

Achieving an optimal configuration of public policy and investment choices in infrastructure that acts to “crowd in” rather than “crowd out” private finance and investment – for example, building a smart electricity grid – will be a requirement to create long-term capital

stock that supports the green economic transition (UNEP 2010). As noted earlier, between 15 to 20 per cent of the US\$ 3 trillion global public stimulus packages pledged in response to the financial crisis, upward of US\$ 470 billion, was earmarked for green economy spending, including significant amounts for job-creating green infrastructure projects.

These investments are not confined to short-term responses to the financial and economic crisis, however, and new thought is being given beyond the recovery to ensuring a lasting transition. For example, during the 12th five-year plan period starting 2011, the Chinese government will invest US\$ 468 billion in green sectors compared to US\$ 211 billion over the last five years, with a focus on three sectors: waste recycling and re-utilisation; clean technologies; and renewable energy. With this amount of public investment, China’s environmental protection industry is expected to continue growing at an average of 15 to 20 per cent per year and its industrial output is expected to reach US\$ 743 billion during the new five-year period, up from US\$ 166 billion in 2010. The multiplier effect of this emerging sector is estimated to be 8 to 10 times larger than other industrial sectors.

In countries where public financing based on tax revenues and governments’ ability to borrow from capital markets are constrained, reform of subsidies and taxation policies can be used to open fiscal space for green investments. Subsidies in the areas of energy, water, fisheries and agriculture, for example, reduce the prices and encourage excessive use of the related natural capital. At the same time, they impose a recurrent burden on the public budget. Phasing out such subsidies and introducing taxes on the use of energy and natural resources can enhance efficiency while strengthening public finance and freeing up resources for green investments. Removing subsidies in these four sectors alone, for example, would save between 1 to 2 per cent of global GDP every year.

6 Conclusions

The financial sector's role in facilitating progress towards sustainable development has evolved considerably since the concept first received global attention at the UN Conference of Environment and Development in Rio de Janeiro in 1992. The intervening years have seen significant developments, ranging from successful partnership initiatives such as the UNEP Finance Initiative⁷ and the PRI⁸ to the integration of ESG factors in asset ownership and significant growth in private sector flows to niche asset classes such as microfinance, clean technology and sustainable energy. Investors are increasingly moving from responsible investment (do no harm) to sustainable investment (investment in solutions to sustainability challenges).

A global transition towards a green economy will require substantial redirection of investment to increase the current level of public and private sector flows to key priority areas, the bulk of which will need to be mobilised through financial markets. Analysis and modelling conducted for the Green Economy Report suggests that the level of additional investment needed is between 1 to 2.5 per cent of global GDP per year from 2010 to 2050. Currently, green economy investment is well below 1 per cent of global GDP.

The vast majority of the investment that needs to be re-directed to the green economy will need to come from the private financial sector if key sustainable development goals are to be achieved in the necessary time scales. National and international public sector resources are significantly smaller than those of the global financial market. Following the 2008 to 2009 financial crisis, the BIS has projected a high debt/GDP ratio for many major economies for the next twenty years. As a consequence, public funds available for a shift to a green economy are likely to be far below the level required. Developing countries, with the exception of the most vibrant emerging economies, will have limited fiscal options to support a green economy.

If a robust business case can be created and properly demonstrated, for example, by governments fully implementing the "polluter pays" and "user pays"

principles agreed by OECD countries, then arguably some of this re-deployment of capital will occur naturally as investors pursuing enlightened self-interest shift their assets from less attractive brown economy (based on fossil fuels) activities. Opportunities for scaling up green finance exist across the market, especially in sectors such as renewable energy or green property, and in mainstream finance through the growing trend towards consideration of ESG issues and accounting for environmental externalities. However, less mature and nascent segments of green economy finance – such as REDD+ or sustainable energy services for the poor – will require patient and wise incubation.

However, public financing is essential for the transition to a green economy and more than justified by the positive externalities that would be generated. The role of public finance in supporting a green economy was demonstrated by the green components of the massive fiscal stimulus packages launched by G20 countries in responding to the financial and economic crisis, which broke out in 2008. Out of the US\$ 3 trillion of the stimulus funds, more than 15 per cent was allocated to green sectors or to greening brown sectors.

Public financing for green investments is not confined to short-term responses to the financial and economic crisis. The Republic of Korea, for example, has included public funds for green investments in the country's five-year development plan. In many least developed countries, however, public financing covering tax revenues and governments' ability to borrow directly from capital markets is seriously constrained. In these countries, international and regional development banks should explore how they can increase development finance that supports agreed priorities for green investment.

Green stimulus packages and agile financial markets alone are unlikely to unlock the scale of private finance needed for the transition to a green economy. Sound public policies and enabling regulatory frameworks are also indispensable. Although an increasing number of financial institutions are becoming interested in a green economy, the majority of market players remain wedded to the traditional, brown economy. This is largely due to inadequate policy and regulatory frameworks that fail to provide a level playing field. The risk/reward equation still works unfavourably for would-be green investors.

Governments should involve the private sector in establishing stable and coherent policy and regulatory

7. In 2010, 200 banks, insurers and investment organizations were signatories to the United Nations Environment Programme Finance Initiative. <http://www.unepfi.org>

8. A further 900 investment organizations, including service organizations, support the UN-backed Principles for Responsible Investment. <http://www.unpri.org/principles>

frameworks that would better integrate environmental, social, and governance issues in investment decisions and financial policy making. In addition, governments and multilateral financial institutions should use their own resources to leverage the financial flows from the private sector and direct them towards the fledgling green economic opportunities.

In the lead up to the Rio+ 20 Earth Summit in Brazil in 2012, there is a need to establish clear and workable frameworks, including regulation where necessary, to rebalance the risk/reward equation for financial and investment practitioners in favour of green investment. It is clear that across banking, investment and insurance

– the core activities of the world's financial system – significant changes in philosophy, culture, strategy and approach, notably the overwhelming dominance of “short-termism”, will be required if capital and finance are to be reallocated to accelerate the emergence of a green economy. At the same time, fundamental aspects of international accounting systems and capital market disciplines, as well as our understanding of fiduciary responsibility in investment policy making and investment decision making, will need to evolve to fully integrate a broader range of ESG factors than takes place today. Without these changes, the pricing signals and incentives that could support the transition to a green economy will remain weak.

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