

INVESTMENT AND FINANCIAL FLOWS TO ADDRESS CLIMATE CHANGE

Background paper on analysis of existing and planned investment and financial flows relevant to the development of effective and appropriate international response to climate change

TABLE OF CONTENTS

I. INTRODUCTION	020
II. METHODOLOGY	022
2.1. Interpretation of investment and financial flows	022
2.2. Methodology overview	022
2.3. Scenarios	022
2.3.1. Scenarios used for the mitigation analyses	022
2.3.2. Scenarios used for the adaptation analyses	023
2.4. Projected greenhouse gas emissions	024
2.5. Comparison with the scenario literature	025
III. CURRENT AND REFERENCE SCENARIO INVESTMENT AND FINANCIAL FLOWS	027
3.1. Data on current investment flows	027
3.1.1. Gross fixed capital formation	027
3.1.2. Households	028
3.1.3. Governments	028
3.1.4. Financial corporations and non-financial corporations	028
3.1.5. Foreign direct investment	028
3.1.6. International debt	029
3.1.7. Official development assistance	029
3.1.8. Domestic funds	030
3.1.9. Overview of current investment flows	030
3.2. Current financial flows	032
3.3. Investment flows needed in 2030	032
3.4. Financial flows needed in 2030	034
3.5. Interpretation of the estimates of investment and financial flows	034
IV. AN OVERVIEW OF INVESTMENT AND FINANCIAL FLOWS NEEDED FOR MITIGATION	035
4.1. Introduction	035
4.2. Scenarios	036
4.3. Limitations in estimating mitigation costs	036
4.4. Investment and financial flows needed for mitigation	037
4.4.1. Energy supply	037
4.4.2. Industry	052
4.4.3. Transportation	059
4.4.4. Buildings	064
4.4.5. Waste	069
4.4.6. Agriculture	072
4.4.7. Forestry	077
4.5. Technology research and development	086
4.5.1. Introduction	086
4.5.2. Current situation on technology research and development	088
4.5.3. Estimated investment and financial flows needed	090
4.5.4. Assessment of the changes needed in investment, financial and policy arrangements to fill the gap under the mitigation scenario	092
4.6. Conclusions	092

TABLE OF CONTENTS

V. AN OVERVIEW OF INVESTMENT AND FINANCIAL FLOWS NEEDED FOR ADAPTATION	096
5.1. Introduction	096
5.2. Scenarios	096
5.3. Limitations in estimating adaptation costs	097
5.3.1. Adaptive capacity	097
5.3.2. Adaptations are typically not solely climate change related	098
5.3.3. Methods for estimating adaptation costs	098
5.3.4. The existence of an adaptation deficit	099
5.4. Analysis of investment and financial flows to address adaptation needs	099
5.4.1. Agriculture, forestry and fisheries	099
5.4.2. Water supply	105
5.4.3. Human health	108
5.4.4. Natural ecosystems (terrestrial and marine)	113
5.4.5. Coastal zones	116
5.4.6. Infrastructure	121
5.5. Avoided damages	124
5.6. Conclusion	125
VI. PRIORITIES FOR MITIGATION AND ADAPTATION AS REPORTED BY DEVELOPING COUNTRIES UNDER THE CONVENTION	127
6.1. Priority areas for mitigation	127
6.1.1. Sectoral analysis of priority areas	129
6.2. Priorities areas for adaptation	131
6.2.1. Sectoral analysis	134
6.3. Capacity-building needs	135
6.4. Barriers to technology transfer	136
6.5. Impact of the implementation of response measures	136
VII. POTENTIAL OF CARBON MARKETS	138
7.1. Introduction	138
7.2. Carbon markets	138
7.2.1. Existing carbon markets	138
7.2.2. Kyoto Protocol markets	138
7.2.3. European Union emissions trading scheme	146
7.2.4. Norway	148
7.2.5. United Kingdom of Great Britain and Northern Ireland	148
7.2.6. New South Wales–Australian Capital Territory Greenhouse Gas Abatement Scheme	148
7.2.7. Chicago Climate Exchange	148
7.2.8. Voluntary market	149
7.2.9. Links among emissions trading systems	150
7.2.10. Carbon funds	150
7.3. Prospects for the carbon market for the period 2008 – 2012	151
7.3.1. Demand	151
7.3.2. Supply	152
7.3.3. Prices	153
7.3.4. Market size	154
7.3.5. Share of proceeds for the Adaptation Fund	154

TABLE OF CONTENTS

7.3.6. Voluntary market	154
7.4. Potential size of the carbon market to 2030	156
7.4.1. Estimated demands	156
7.4.2. Potential supply	159
7.4.3. Summary	160
VIII. FINANCIAL COOPERATION UNDER THE CONVENTION AND ITS KYOTO PROTOCOL	162
8.1. Introduction	162
8.2. Financial mechanism under the Convention	162
8.2.1. GEF Trust Fund	164
8.2.2. Special Climate Change Fund	168
8.2.3. Least Developed Countries Fund	168
8.3. Adaptation Fund	169
IX. POTENTIAL FOR ENHANCED INVESTMENT AND FINANCIAL FLOWS	170
9.1. Introduction	170
9.2. Key findings	170
9.2.1. Overview of current investment and financial flows	170
9.2.2. Key findings on investment and financial flows needed for mitigation in 2030	172
9.2.3. Key findings on investment and financial flows needed for adaptation in 2030	176
9.2.4. Priorities identified by developing country Parties in the UNFCCC process	178
9.3. Key factors and options determining future investment and financial flows	178
9.3.1. Shift investments and financial flows	178
9.3.2. Scale up funding	183
9.3.3. Optimize the allocation of the funds	186
9.4. Conclusions	192
ANNEX I REGION DEFINITIONS	194
ANNEX II DESCRIPTION OF DATA AND DATA SOURCES	196
ANNEX III WORLD HEALTH ORGANISATION REGIONS	201
ANNEX IV POSSIBLE SOURCES OF EXPANDED FUNDING	203
ANNEX V SUPPLEMENTARY TABLES AND FIGURES	210
REFERENCES/SOURCES	260
ACKNOWLEDGEMENTS	268

LIST OF TABLES

Table	Page
Table III-1. Sources and sectors for gross fixed capital formation	27
Table III-2. Overview of investment flow data	31
Table III-3. Sources of investment in 2000	31
Table III-4. Global investment by sector in 2000 and 2030 (percentage)	33
Table III-5. Total current and projected investment by region	33
Table IV-6. Investment flows for electricity, gas distribution and water supply in 2000 (percentage), by source and region	40
Table IV-7. Alternative estimates of investment in energy supply in 2000 and 2005 for various components of energy supply (billions of United States dollars)	43
Table IV-8. Overview of funding sources in 2005 (millions of United States dollars)	43
Table IV-9. Investment in energy supply needed under the reference scenario in 2030 (billions of United States dollars)	46
Table IV-10. Investment in energy supply needed under the mitigation scenario in 2030 (billions of United States dollars)	47
Table IV-11. Investment flows needed for energy supply under the reference and mitigation scenarios in 2030 (billions of United States dollars)	49
Table IV-12. Industrial sector fuel consumption and CO ₂ eq emissions in 2000	52
Table IV-13. Fuel consumption and GHG emissions in 2030 under the reference scenario in the industrial sector	53
Table IV-14. Fuel consumption and GHG emissions in 2030 under the mitigation scenario for the industrial sector	55
Table IV-15. Investment flows in the manufacturing sector in 2000, by source and region (percentage)	56
Table IV-16. Investment flows in the industrial sector by region and time period (billions of United States dollars)	57
Table IV-17. Additional investment flows needed under the mitigation scenario in 2030 in the industrial sector (millions of United States dollars)	57
Table IV-18. Investment flows in the transportation, storage and communications sector in 2000, by source and region (percentage)	60
Table IV-19. Projected transport-related investments under the reference scenario, (billions of United States dollars)	61
Table IV-20. Estimated share of additional investment in the transportation sector under the mitigation scenario in 2030, by region (billions of United States dollars)	62
Table IV-21. Fuel consumption and GHG emissions of the buildings sector in 2000	64
Table IV-22. Fuel consumption and GHG emissions of the buildings sector in 2030, under the reference scenario	65
Table IV-23. Fuel consumption and greenhouse gas emissions of the buildings sector in 2030, under the mitigation scenario	66
Table IV-24. Investment flows in the construction sector by source and region in 2000 (percentage)	67
Table IV-25. Investment flows in the residential and commercial sector by region and time period (billions of United States dollars)	68
Table IV-26. Additional investment needed in the buildings sector under the mitigation scenario in 2030 (billions of United States dollars)	68
Table IV-27. Greenhouse gas emissions under the reference and mitigation scenarios and additional investment required for the waste sector in 2030	70
Table IV-28. Investment by source for agriculture, forestry and fisheries in 2000 (percentage)	73
Table IV-29. Investment flows in the agriculture sector by region and time period (millions of United States dollars)	73
Table IV-30. Reference scenarios for non-carbon dioxide greenhouse gas emissions (Mt CO ₂ eq) by source through 2030	75
Table IV-31. Approximate shares of non carbon dioxide greenhouse gas from management operations	75
Table IV-32. Potential total reductions in emissions (Mt CO ₂ eq) from agriculture for selected countries and regions with carbon prices at USD 0 and USD 30 per t CO ₂ eq, with constant herd size	75
Table IV-33. Summary of investment flows for the reference and mitigation scenarios in 2030 (billions of United States dollars)	76
Table IV-34. Information on funding and investment flows in the forestry sector	79
Table IV-35. Cost for reducing deforestation	81
Table IV-36. Potential removal by sinks through forest management	83
Table IV-37. Investment and financial flows needed for mitigation options in the forestry sector	83
Table IV-38. Proposal for policy approaches and positive incentives to reduce emissions from deforestation in developing countries	85
Table IV-39. Additional investment and financial flows and greenhouse gas emission reductions	93
Table V-40. Expenditures in agriculture, forestry and fisheries (millions of United States dollars)	103
Table V-41. Investment and financial flows needed in 2030 for economic and population growth and for adaptation to the adverse impacts of climate change (millions of United States dollars)	103

LIST OF TABLES

Table	Page
Table V-42. Adaptation measures in the water resource sector	105
Table V-43. Investment and financial flows needed in 2030 for economic and population growth and for adaptation to the adverse impacts of climate change for the SRES A1B and B1 scenarios (billions of United States dollars)	106
Table V-44. Selected indicators of health expenditure ratios for the year 2000	109
Table V-45. Development assistance for health, selected years (millions of United States dollars)	110
Table V-46. Projected excess incident cases (in thousands) in 2030 of diarrhoeal diseases, malnutrition, and malaria for the 750 ppmv and 550 ppmv stabilization scenarios (middle estimates)	110
Table V-47. Estimated additional financial flows needed in 2030 to cover the cost of additional cases of diarrhoeal diseases, malnutrition, and malaria due the adverse impacts of climate change (millions of United States dollars)	111
Table V-48. Comparison of current diarrhoeal disease, malnutrition, and malaria cases with estimated climate change impacts in 2030 for the 750 ppmv and 550 ppmv stabilization scenarios (thousands of cases)	111
Table V-49. Major physical impacts and potential adaptation responses to sea level rise	117
Table V-50. The range in sea level rise by 2030 (relative to 1990) expected for each SRES scenario (cm)	117
Table V-51. Investment and financial flows needed in 2030 for adaptation to sea level rise assuming anticipation to 2080 for the SRES A1B and B1 scenarios (millions of United States dollars)	119
Table V-52. Estimated additional investment needed in coastal infrastructure for the SRES A1B and B1 scenarios in 2030 by region (millions of United States dollars)	119
Table V-53. Additional investment needed to adapt infrastructure to climate change risks in 2030 (millions of United States dollars)	123
Table VII-54. Incremental impact of the CER price on the internal rate of return (IRR) of the project (percentage per purchase period)	143
Table VII-55. Possible levels of funding for the Adaptation Fund trustee account to 2012	155
Table VIII-56. GEF Trust Fund allocations and co-financing (millions of United States dollars)	164
Table VIII-57. Multilateral and bilateral funding for energy during the period 1997 – 2005 (millions of United States dollars)	165
Table VIII-58. Allocation of GEF resources to climate change activities for the period 1991 – 2007 (millions of United States dollars)	167
Table IX-59. Overview of current sources of financial flows relevant to climate change	171
Table IX-60. Current and projected size of the international carbon markets	173
Table IX-61. Investment for energy supply under the reference and mitigation scenarios in 2030 (billions of United States dollars)	173
Table IX-62. Additional investment for emission reductions under the mitigation scenario for related sectors in 2030 (billions of United States dollars)	174
Table IX-63. Additional investment and financial flows under the mitigation scenario for forestry and agriculture in 2030 (billions of United States dollars)	174
Table IX-64. GHG emission reductions and additional investment and financial flows	175
Table IX-65. Estimated additional investment and financial flows needed for adaptation in 2030 (billions of United States dollars)	177
Table IX-66. Illustrative options for raising additional revenue for addressing climate change	186
Table IX-67. Investment preferences	187

LIST OF FIGURES

Table	Page
Figure II-1. Total greenhouse gas emissions under reference and mitigation scenarios	24
Figure II-2. Energy supply and related greenhouse gas emissions under the reference and mitigation scenarios	24
Figure II-3. Emissions projections of the scenarios used for the analyses and the scenario literature	25
Figure II-4. Comparison of the main driving forces of greenhouse gas emissions under different scenarios in the literatures	26
Figure IV-5. Share of global greenhouse gas emissions by major sectors in 2004	35
Figure IV-6. Global primary energy mix in 2004	38
Figure IV-7. Global primary energy mix in 2030 under the reference scenario	39
Figure IV-8. Global primary energy mix in 2030 under the mitigation scenario	41
Figure IV-9. Cumulative capacity additions in the reference and mitigation scenarios, 2004 – 2030	41
Figure IV-10. Energy-related carbon dioxide emissions under the reference and mitigation scenarios, 2004 – 2030	41
Figure IV-11. Investment in energy supply needed under the reference and mitigation scenarios, 2005 – 2030	49
Figure IV-12. Estimated economic mitigation potential in the forestry sector by region and cost class	80
Figure IV-13. The innovation cycle	87
Figure IV-14. Government R&D expenditure in IEA countries and oil price from 1974 to 2004	89
Figure IV-15. Emission reductions by technology under the mitigation scenario in 2030, in Gt CO ₂ eq	91
Figure IV-16. Annual additional investment by technology by region under the mitigation scenario in 2030	91
Figure VI-17. Regional and sectoral distribution of mitigation project proposals	127
Figure VI-18. Mitigation sectors, sub-sectors and technologies commonly identified by Parties in technology needs assessments	128
Figure VI-19. Needs for renewable energy technology commonly identified by non-Annex I Parties	129
Figure VI-20. Needs for energy efficient technology in the buildings and residential sectors commonly identified by non-Annex I Parties	130
Figure VI-21. Cost of priority activities identified in national adaptation programmes of action, by country	132
Figure VI-22. Costs of priority activities identified in national adaptation programmes of action, by sector	132
Figure VI-23. Adaptation sectors, sub-sectors and technologies commonly identified by Parties in technology needs assessments	133
Figure VI-24. Barriers to technology transfer identified by Parties	137
Figure VI-25. Economic and market barriers to technology transfer	137
Figure VII-26. Projects that entered the clean development mechanism pipeline in 2006, by project type/sector	140
Figure VII-27. Estimated certified emission reductions from projects that entered the clean development mechanism pipeline in 2006, by project type/sector	141
Figure VII-28. Regional distribution of clean development mechanism project activities registered and in the pipeline in 2006	142
Figure VII-29. Volume of certified emission reductions from clean development mechanism project activities registered and in the pipeline in 2006, by region	142
Figure VII-30. Number of joint implementation projects that entered the pipeline in 2006, by type of project/sector	145
Figure VII-31. Annual emission reduction units from joint implementation projects that entered the pipeline in 2006, by type of project/sector	145
Figure VII-32. EU allowance prices and traded volumes, February 2006 – January 2007	147
Figure VII-33. Trade volumes and prices in the world's carbon markets in 2006	149
Figure VII-34. Estimated supply of Kyoto units in 2010 (Mt CO ₂ eq per year)	152
Figure VII-35. Expected prices for EU allowances in 2010 and 2020, based on response to Point Carbon survey	154
Figure VII-36. Estimated demand for emission reduction units in 2010	155
Figure VII-37. Comparison of demand estimates	158
Figure VII-38. Estimated supply from current CDM pipeline, 2000 – 2030	159
Figure VII-39. Estimated carbon market size for high demand estimate	161
Figure VIII-40. Allocation of funds available through the Global Environment Facility among its operational programs	167
Figure IX-41. Technology cost and financing curve	188

ACRONYMS AND ABBREVIATIONS

AAU	assigned amount unit (equal to one metric tonne of carbon dioxide equivalent)	ETS	emissions trading scheme
ABI	Association of British Insurers	EU	European Union
ACT	Australian Capital Territory	EUA	European Union allowances
AFF	agriculture, forestry and fisheries	EUR	euro
AI Parties	Parties included in Annex I to the Convention	FAO	Food and Agriculture Organisation of the United Nations
AR4	Fourth Assessment Report of the IPCC	FAOSTAT	Food and Agriculture Organisation Statistical Database
AUD	Australian dollar	FDI	foreign direct investment
BAPS	Beyond the Alternative Policy Scenario	FRA 2005	Global Forest Resources Assessment 2005
BAU	business as usual	FRCs	forest retention certificates
BIS	Bank for International Settlement	FRIS	forest retention incentive scheme
CAIT	Climate analysis indicators tool	G8	Group of Eight
CCLA	Climate Change Levy Agreements	GBD	global burden of disease
CCRIF	Caribbean Catastrophe Risk Insurance Facility	GBI	global environmental benefit index
CCS	carbon dioxide capture and storage	GBP	pound sterling
CCX	Chicago Climate Exchange	GDP	gross domestic product
CDIAC	carbon dioxide information on analysis center	GEF	Global Environment Facility
CDM	clean development mechanism	GEF 1	first replenishment of the GEF
CER	certified emission reduction (equal to one metric tonne of carbon dioxide equivalent)	GEF 2	second replenishment of the GEF
CGIAR	Consultative Group on International Agricultural Research	GEF 3	third replenishment of the GEF
CH ₄	methane	GEF 4	fourth replenishment of the GEF
CHP	combined heat and power	GEF 5	fifth replenishment of the GEF
CO ₂	carbon dioxide	GFCF	gross fixed capital formation
CO ₂ eq	carbon dioxide equivalent	GHG	greenhouse gas
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	GTCC	gas turbine combined cycle
COP	Conference of the Parties	GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
CRS	creditor reporting system	HCFC	hydrochlorofluorocarbon
CT	combustion turbine	HFC	hydrofluorocarbon
DAC	OECD Development Assistance Committee	HVAC	heating, ventilation and air conditioning
DALY	disability adjusted life year	IATAL	international air travel adaptation levy
DAYCENT	daily service of century model	ICAO	International Civil Aviation Organisation
DIVA	Dynamic Interactive Vulnerability Assessment tool	IEA	International Energy Agency
DNDC	denitrification decomposition model	IETA	International Emissions Trading Association
DOE	designated operational entity	IFC	International Finance Corporation
DSM	demand side management	IFI	International Financial Institution
EAs	enabling activities	IMF	International Monetary Fund
EBRD	European Bank for Reconstruction and Development	IGO	Intergovernmental organization
EC	European Commission	IMO	International Maritime Organisation
EE	energy efficiency	INC	initial national communication
EEA	European Environment Agency	IPCC	Intergovernmental Panel on Climate Change
EIB	European Investment Bank	IRR	internal rate of return
EMF	Energy Modeling Forum	ITTO	International Tropical Timber Organisation
EPPA	emissions prediction and policy analysis	IUCN	International Union for the Conservation of Nature and Natural Resources
eq	equivalent	JI	joint implementation
ERPA	emission reduction purchase agreement	JISC	Joint Implementation Supervisory Committee
ERU	emission reduction unit (equal to one metric tonne of carbon dioxide equivalent)	LAC	Latin America and the Caribbean
		ICER	long term certified emission reduction
		LDCF	Least Developed Countries Fund
		LDCs	least developed countries

ACRONYMS AND ABBREVIATIONS

LNG	liquefied natural gas
LPG	liquefied petroleum gas
LULUCF	land use, land-use change, and forestry
M&A	mergers and acquisitions
MDB	multilateral development bank
MDGs	Millennium Development Goals
MOU	memorandum of understanding
N ₂ O	nitrous oxide
NAI Parties	Parties not included in Annex I to the Convention
NAPA	national adaptation programmes of action
NC	national communication
NEF	New Energy Finance
NFP	national forest programme
NGO	non-governmental organization
NSW	New South Wales
NTFP	non-timber forest products
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
OP	operational programme
PCF	Prototype Carbon Fund
PDD	project design document
PDF	project development facility
PE	private equity
PFC	perfluorocarbon
PIF	project identification form
PRODEEM	Programme for Energy Development of States and Municipalities
PROFOR	Program on forests
RAF	resource allocation framework
R&D	research & development
RE	renewable energy
REDD	reducing emissions from deforestation in developing countries
RET	renewable energy technology
RGGI	regional greenhouse gas initiative
RMS	Risk Management Solutions
RMU	removal unit (equal to one metric tonne of carbon dioxide equivalent)
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SD-PAM	Sustainable development policies and measure
SDR	special drawing right
SFM	sustainable forest management
SIDS	small island developing States
SPA	strategic priority on adaptation
SRES	Special Report on Emissions Scenario
STRM	short-term response measures
tCER	temporary certified emission reduction

T&D	transmission and distribution
TNA	technology needs assessment
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP FI	United Nations Environment Programme Finance Initiative
UNEP SEFI	United Nations Environment Programme Sustainable Energy Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
UNSTAT	United Nations Statistics Division
US EPA	United States Environmental Protection Agency
USD	United States dollar
VAT	value added tax
VC	venture capital
WB	World Bank
WBCSD	World Business Council on Sustainable Development
WEC	World Energy Council
WEO	World Energy Outlook
WG	Working Group
WHO	World Health Organisation
WRI	World Resources Institute
WSSD	World Summit on Sustainable Development

UNITS OF MEASURE

b	billion
cm	centimeter (10^{-2} meter)
EJ	10^{18} Joule
G	giga (1×10^9)
GJ	10^9 Joule
h	hour
ha	hectare
m	million (1×10^6)
m ³	cubic meter
MJ	10^6 Joule
ppmv	part per million by volume
t	tonne
T	tera (1×10^{12})
toe	tonne oil equivalent
W	watt
°C	degree Celsius

I. INTRODUCTION

1. This technical background paper reviews and analyses existing and projected investment flows and financing relevant to the development of an effective and appropriate international response to climate change, with particular focus on the needs of developing countries. It provides an assessment of the investment and financial flows that will be necessary in 2030 to meet worldwide requirements for mitigating and adapting to climate change under different scenarios of social and economic development, especially as they impact the well-being of developing countries. In particular it provides:
 - Information on current investment and financial flows in as much detail as is available;
 - Projection of investment and financial flows by major sources to address adaptation and mitigation needs in 2030, including:
 - Projections of future investment and financial flows under a reference scenario;
 - Projections of future investment and financial flows under a greenhouse gas (GHG) emissions mitigation scenario;
 - A summary of priorities identified by Parties not included in Annex I to the Convention (Non-Annex I Parties) as part of the UNFCCC process;
 - An analysis of the potential role of different sources of investment and financing and their future potential.
2. This paper has been prepared as background information for three papers requested by the Conference of the Parties at its twelfth session (COP 12):
 - A paper that provides an analysis of existing and planned investment flows and finance schemes relevant to the development of an effective and appropriate international response to climate change for the consideration by the fourth workshop on the dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention (the Dialogue)¹;
 - Two papers for the consideration by the Subsidiary Body for Implementation (SBI) in its fourth review of the financial mechanism of the Convention at its twenty-seventh session,² namely:
 - A technical paper reviewing the experience of international funds, multilateral financial institutions and other sources of funding that may be used to meet current and future investment and financial needs of developing countries for the purposes of meeting their commitments under the Convention;
 - A report prepared in collaboration with the Global Environment Facility (GEF) secretariat, on the assessment of the funding necessary to assist developing countries.
3. To ensure that this analysis is beneficial to the UNFCCC process, the secretariat has collaborated with a number of international financial institutions (IFIs), United Nations agencies, intergovernmental organizations (IGOs) and non-governmental organizations (NGOs), other relevant agencies, and representatives of the private sector and civil society. These organizations and representatives were invited to share their experiences and views on existing and planned investment flows and finance schemes in the context of consultations.
4. Four consultative meetings with such stakeholders have been held. Two consultative meetings were held in Bonn, Germany, with experts and representatives of IFIs, United Nations agencies, IGOs and NGOs to discuss the role of international public financing activities in addressing climate change (5–6 February and 26–28 March 2007). Another two consultative meetings were held in London, United Kingdom (20 and 21 June 2007), in collaboration with representatives of the private financial sector (including investment banks, venture capital firms, private funds, insurers and reinsurers) and the insurance sector.³
5. The paper draws on existing work and analysis wherever possible. Existing work used for the analysis includes the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), the World Energy Outlook (WEO) of the International Energy Agency (IEA), the Stern Review and other published literature.⁴

6. This paper is divided into nine main parts:
- An introduction to the overall methodology and scenarios used in the paper and a summary of overall current investment and financial flows ([CHAPTERS II and III](#));
 - An analysis of needs and corresponding investment and financial flows for climate change mitigation, including needs and flows related to technology research and development (R&D) ([CHAPTER IV](#));
 - An analysis of needs and corresponding investment and financial flows for climate change adaptation ([CHAPTER V](#));
 - A summary of priorities related to mitigation and adaptation identified by non-Annex I Parties under the UNFCCC process ([CHAPTER VI](#));
 - An analysis of the potential of carbon markets ([CHAPTER VII](#));
 - An overview of financial assistance under the Convention ([CHAPTER VIII](#));
 - An analysis of the potential for enhanced investment and financial flows ([CHAPTER IX](#)).

¹ FCCC/CP/2006/5, paragraph 61.

² These papers should be made available in the last quarter of 2007 as documentation for consideration at SBI 27. Please refer to decision 2/CP.12 for details of the mandates.

³ In collaboration with the World Business Council on Sustainable Development (WBCSD), the United Nations Environment Programme Finance Initiative (UNEP FI), the United Nations Environment Programme Sustainable Energy Finance Initiative (UNEP SEFI), the European Carbon Investors and Services, the International Emissions Trading Association (IETA) and the World Energy Council (WEC).

⁴ For detailed information, please refer to the list of database and references in [ANNEX II](#).