DEVELOPMENT COMMITTEE
(Joint Ministerial Committee
of the
Boards of Governors of the Bank and the Fund
On the
Transfer of Real Resources to Developing Countries)

DC2007-0002
March 28, 2007

CLEAN ENERGY FOR DEVELOPMENT INVESTMENT FRAMEWORK:

THE WORLD BANK GROUP ACTION PLAN

Attached for the April 15, 2007, Development Committee Meeting is a background report entitled "Clean Energy for Development Investment Framework: The World Bank Group Action Plan," prepared by the staff of the World Bank.

* * *

CLEAN ENERGY FOR DEVELOPMENT INVESTMENT FRAMEWORK: THE WORLD BANK GROUP ACTION PLAN

Sustainable Development Network

March 6, 2007

ABBREVIATIONS AND ACRONYMS

AAA	Advisory Services
AAP	Africa Action Plan
ADB	Asian Development Bank
AfDB	African Development Bank
ALRMP	Arid Lands Resource Management Program
APS	Alternative Policy Scenario
ASTAE	Alternative Energy Program
AU	Africa Union
CAS	Country Assistance Strategy
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CEIF	Clean Energy Investment Framework
CFL	Compact Fluorescent Lights
CMI	Carbon Market Initiative
DMCs	Developing member countries
DOTS	Development Outcome Tracking System
DRC	Democratic Republic of Congo
EBRD	European Bank for Reconstruction and Development
EEI	Energy Efficiency Initiative
EIB	European Investment Bank
ERPA	Emission Reduction Purchase Agreement
ESMAP	Energy Sector Management Assistance Program
ESW	Economic Sector Work
EU	European Union
GCRF	Global Catastrophe Risk Facility
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Disaster Reduction and Recovery
GHGs	Greenhouse Gases
GTZ	Deutsche Gesellschaft fur Technische Zusammenarbeit
IADB	Inter-American Development Bank
IAP	Infrastructure Action Plan
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IEA	International Energy Agency
IEG	Independent Evaluation Group
IFC	International Finance Corporation
IFIs	International Financial Institution
IGCC	Integrated gasification combined cycle
IREDA	Indian Renewable Energy Development Agency
JI	Joint Implementation projects
LDCF	Least Developed Countries Fund
LED	Light Emitting Diodes
MDGs	Millennium Development Goals
MtCO2	Million tonnes of Carbon Dioxide
NEPAD	New Partnership for Africa Development
PPIAF	Public-Private Infrastructure Advisory Facility
PPP	Purchasing Power Parity
QAG	Quality Assurance Group
RE/EE	Renewable energy and energy efficiency
RS	Indian Rupee
SCCF	Special Climate Change Fund
SD	Sustainable Development
SECCI	Sustainable Energy and Climate Change Initiative
SEI	Sustainable Energy Initiative
SPA	Special Priority for Adaptation
SSA	Sub-Saharan Africa (SSA
SWAP	Sector-wide programmatic approach
tCO2e	Tonnes of carbon dioxide equivalents
UK	United Kingdom
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
WBG	World Bank Group

CLEAN ENERGY FOR DEVELOPMENT INVESTMENT FRAMEWORK: THE WORLD BANK GROUP ACTION PLAN

CONTENTS

CLEAN ENERGY FOR DEVELOPMENT INVESTMENT FRAMEWORK: THE WORLD BANK GROUP ACTION PLAN

EXECUTIVE SUMMARY

i. This Action Plan provides an update of work undertaken to date as well as actions planned by the World Bank Group (WBG) in support of the Clean Energy for Development Investment Framework (CEIF). The Action Plan:

- ***Provides for a strong overall WBG energy program***, responding to the demands of the CEIF. *Total energy support*, from all sources (WBG, Carbon Finance, GEF) is expected to be in excess of $10 billion in the three year period since the CEIF was initiated (FY06-08), up from $7 billion over the previous three years. The WBG Action Plan supports partners to improve the efficiency of public infrastructure expenditure and leverages the Bank Group support to encourage private sector participation, not only as a source of investment but also for building capacity. The WBG will work with partner countries to create the environment for competition and private sector participation by decreasing market risks, through changes in the regulatory environment, and technical risks through support for pilot projects.

- ***Supports the Africa energy scale up action plan*** which, with partners, aims to increase the number of households with access to modern energy to 35% by 2015 and 47% by 2030, from low level of 25% currently. The plan calls for sector wide program in countries with conducive sector policies and implementation capacity. Donor interest in the approach has been strong, though new financing has not yet materialized and a financing gap remains. To meet the access targets stated above requires annual investments for energy in Sub-Saharan Africa to increase from $2 billion to $4 billion. Scaling up of the program relies on both the international and domestic private sectors to be effective and sustainable, and increased private public partnerships. Assuming continued strong availability of IDA, sustained annual commitments in the range $700-$800 million would support these programs from the Bank and roughly $200 million per year of private sector financing from IFC.

- ***Supports the transition to a low carbon economy***, especially in the G+5 countries, by scaling up analytical, knowledge and investment support. World Bank Group lending for low carbon projects has grown from roughly $633 million per year in FY03-05 to about $1.7 billion in FY06 representing, in FY06, 37% of new commitments, as compared to 14% in FY03. Beyond the WBG programs, to transition to a low-carbon economy will require mobilization of significant amounts financial resources. The Action Plan includes development of sectoral knowledge and approaches in the areas of energy efficiency, renewables and transportation; global and country level

analytical work, with special emphasis on the +5 Countries; new product development (especially with respect to Carbon Finance); and strategic partnership with the GEF to support continued growth in the low carbon portfolio and leveraging of private finance. The WBG will develop methodologies to assess the carbon footprint of the programs it supports.

- ***Supports countries adaptation to climate variability and change*** through AAA and investment in adaptation to climate change. Development of Risk Management tools and a linkage to related work on Disaster Prevention and Recovery form part of the program. The goal is to assist developing countries reduce their vulnerability to climate variability and projected changes in climate by developing tools and methodologies to "climate-proof" investments, and by increasing investments. Significant financial support, which could come from grants and ODA, would be required to assist client countries adapt to climate change, that is to say to make development more resilient to climate variability and change.

- ***Explores options for enhanced financial products***. This work is important given the key conclusion of the Report delivered to the Development Committee in September 2006, "to make meaningful progress in all three pillars will require a significant increase in funding". Available funding is still insufficient to support the Africa Action Plan to increase access of modern energy in Sub-Saharan Africa, to provide a significant buy-down of the incremental costs of a transition to a low carbon economy, or to climate-proof development at scale.

ii. ***The Action Plan relies on partnerships, including with the IFIs and the Private Sector.*** While it concentrates on maximizing and extending existing instruments, it provides for continued dialogue with governments and the private sector on new approaches to accelerate the transition to a low carbon economy. In addition to increased investments, the private sector has an important role to play in closing the investment gap in many countries. Projects such as Bujagali (Uganda), Nam Theun II (Laos) and China and India Thermal Power Plant Rehabilitation projects are examples of how partnerships with the private sector can work, both on financing but also on enhancing the overall regulatory framework for enhanced partnerships. Increased government capacity to respond to demand for quality and sophistication of governance, e.g., contractual and legal rights, should be one focal point for the WBG strategy. The Action Plan outlines the activities of other partner IFIs and outreach and dialogue activities aimed at advancing the CEIF.

CLEAN ENERGY FOR DEVELOPMENT INVESTMENT FRAMEWORK: THE WORLD BANK GROUP ACTION PLAN

I. BACKGROUND

1. In September 2005 the Development Committee requested the World Bank to develop an *Investment Framework for Clean Energy and Development* – in the context of the Gleneagles Communique on Climate Change, Clean Energy and Sustainable Development which was issued in July 2005. The World Bank presented the outlines of key elements associated with such a work program at the Spring Meetings of the Development Committee, April 2006, in a paper titled: "*Clean Energy and Development: Towards an Investment Framework"*. Progress on this work was reported to the Development Committee at the Annual Meetings in Singapore in September 2006 in a document titled "*An Investment Framework for Clean Energy and Development: A Progress Report.* This paper builds on the previous two papers which made the case for improving access to energy in Sub-Saharan Africa, supporting the transition to a low carbon development trajectory and adapting to the impacts of climate change. The Development Committee broadly endorsed the key findings of the report, and:

- Recognized the lack of access to energy as being an acute problem in many low income countries, especially in Sub-Saharan Africa, and urged donors to provide additional funding and other assistance as required;

- Encouraged activities that cost-effectively and sustainably promote the transition to a low carbon economy, while respecting the circumstances of individual developing countries and without hindering their economic growth;

- Asked the Bank to maximize the use of existing financial instruments and to continue interactions with regional development Banks, the UN agencies, the GEF, the private sector and other interested parties;

- Supported the Bank to work on (in close coordinating with the GEF) further exploring financing options so as to provide incentives and resources to countries to pursue clean energy alternatives and consider new means and mechanisms to make pricing of existing instruments more transparent and competitive to provide incentives and resources to countries to pursue clean energy alternatives;

- Encouraged the development of strategies, tools and financing to meet the challenge of adaptation to increased climate variability, since this can adversely affect the livelihoods of people, especially the poor, and undermines the achievement of the MDGs. Special note was made of the value of protecting future investments from climate volatility.

2. Since the *Progress Report*, two other notable reports have been issued. The first, the Stern Report on the Economics of Climate Change concluded that the cost of inaction was significantly greater than the cost of action. Its conclusions re-affirmed the directions of the CEIF. The second, the first working group report of the 4th International Panel on Climate Change concluded that the chemical composition of the atmosphere continues to change due to human activities –use of fossil fuels and land management practices (e.g., deforestation); that the Earth's climate is changing – warmer, increasing sea level, changing precipitation patterns, melting mountain glaciers, loss of Arctic sea ice, and more extreme weather events; and that it is more than 90% certain that most of the warming of the last 50 years is due to human activities last century.

3. The Action Plan relies on and maximizes the use of existing financial instruments. However, it is important to underline the key conclusion of the Report delivered to the Development Committee in September 2006, "to make meaningful progress in all three pillars will require a significant increase in funding". Available funding is insufficient to support the Africa Action Plan to increase access of modern energy in Sub-Saharan Africa, to provide a significant buy-down of the incremental costs of a transition to a low carbon economy, or to climate-proof development at scale.

II. THE CONTEXT: WORLD BANK GROUP'S ENERGY PROGRAM

4. The World Bank Group's (WBG) energy lending program, to a large extent, mirrors the evolution of private sector participation in power projects in developing countries from 1990 until the late 1990s. With the expectation that the private sector would continue to rapidly increase investment during the mid-1990s, IBRD and IDA downsized its funding for energy projects. The World Bank Group energy sector lending ranged from $3.3 to $4.9 billion annually in the 1990s and bottomed-out at less than $2 billion in FY04. However, the private sector investment in energy peaked in 1997, significantly decreased it's lending thereafter, coincident with the reduced WBG lending.

5. ***A growing energy portfolio.*** The Bank's 2003 Infrastructure Action Plan (IAP) aimed to revitalize this business. The IAP reflected the fact that investment needs were accelerating, private investors had considerably reduced their exposure in the Bank's client countries, and meeting the MDG challenge required continued support for infrastructure. The IAP outlined a clear strategy to rebuild the Bank Group's infrastructure business, including energy, and this positioned the World Bank to respond to the CEIF. IFC also increased their business in the sector. In the three years prior to the CEIF (FY03-05), World Bank Group energy commitments ranged from $1.9 to 2.8 billion, or $7.2 billion for the three year period. Of this, 50 percent of the financing was from IBRD/IDA, 26 percent from IFC and the balance from MIGA, guarantees, carbon offset and the GEF. In FY06, World Bank Group lending for energy reached $4.5 billion. Because of the lumpy nature of energy investments, there will continue to be fluctuations going forward, but the pipeline indicates a continued strong program. Energy commitments for FY06-FY08 are expected to exceed $10 billion over

the three year period, up by about 40% as compared to the previous three year period. The program is also expected to leverage private sector finance, thus increasing its impact. Annex 1, Table A1 provides an overview of the World Bank Group program.

Table 1. Energy Portfolio by Financing Source

Product line	*FY03*	*FY04*	*FY05*	*FY06*
IBRD/IDA	1,088	966	1,569	3,030
Guarantees	75	30	254	
Carbon Offset[1/]	8	35	79	88
GEF[1/]	60	63	105	50
Special Financing	2		1	
World Bank Subtotal	1,233	1,094	2,008	3,168
IFC[2/]	643	592	643	1,178
MIGA	601	186	232	190
Total Energy (US$ million)	2,477	1,872	2,883	4,537

[1/] Revised numbers based on GEF and CF own databases. Minor differences from Business Warehouse – these GEF numbers do not include IFC GEF projects.

[2/] IFC numbers include GEF and Carbon Offset.

Source: World Bank.

6. Country support, through analytical and capacity building activities, is a key component of the overall program of assistance of the World Bank's energy program, supported by Bank funded tasks as well as through the Energy Sector Management Assistance Program (ESMAP) and the Asia Sustainable and Alternative Energy Program (ASTAE). The financial support from 12 donors to ESMAP has increased by 7 percent this year to a total of $16 million in CY06, with expenditures in analytical and capacity building activities increasing by 20 percent. ESMAP has established a Multi-Donor Trust Fund, in response to the need for increased support to the implementation of the CEIF.

7. The ASTAE, supported by multiple donors, has an overarching objective to reduce poverty in the Asia region and stimulate pro-poor growth particularly using clean energy options. To achieve this objective the program offers technical assistance and project development support for initiatives to increase energy access for poor households and increase the use of renewable energy and energy efficiency to reduce GHG emissions. ASTAE support substantially contributed to the US$230 million or 53% of total World Bank support for renewable energy and energy efficiency in East Asia and Pacific region in FY06. In addition, ASTAE supported projects provide over 747,500 households with access to energy. Of particular note is the support provided to China for promulgating the China Renewables Sources Law that supports increasing the share of renewable energy in electricity production to 15 percent of total generation from 7 percent in 2005.

Table 2. Sectoral Breakdown of WBG Energy Lending, FY03-06
(US$ millions)

Energy Sector	*FY03*	*FY04*	*FY05*	*FY06*	*Total (FY03-06)*	*Percent*
Low Carbon	296	463	917	1,410	3,092	26%
Access	202	97	447	289	1,035	9%
Blended Low Carbon/Access	51	56	115	258	485	4%
Transmission & Distribution	181	188	123	525	1,017	9%
Oil & Gas	74	41	113	413	641	5%
Other Thermal Generation	75	44	29	270	418	4%
Other Energy	1,598	983	1,139	1,372	5,092	43%
Total Energy	2,477	1,872	2,883	4,537	11,769	100%

Definitions:

Low Carbon Projects: renewable energy projects (including all size hydropower), energy efficiency, power plant rehabilitation; district heating, biomass waste fueled energy; gas flaring reduction; high efficiency coal fired plants (super-critical and ultra-supercritical) thermal plants.

Access Projects: projects aimed at increasing access to electricity.

Blended Low Carbon/Access projects: access projects that use low carbon energy options (such as renewables) to increase access to electricity and other energy forms.

Transmission & Distribution, Oil & Gas, and Other Thermal Generation. Conventional projects that meet local environmental standards but do not specifically target lower carbon or energy efficiency solutions.

Other Energy: Includes projects where energy policy support is provided such as Energy Sector Development Policy Loans or other WBG interventions where the form of energy cannot be clearly distinguished, or where there are multiple energy sub-sectors supported within a single project.

Source: World Bank.

8. ***The access agenda***. Bank Group support for electrification projects has been an important feature of our poverty alleviation agenda. Lending rose from $150-250 million per annum range in FY03-04 to the $550 million per annum range in FY05-06 (see Table 3). The World Bank group support for increasing access to energy for development is expected to further strengthen Bank Group support in the coming years, especially in Sub-Saharan Africa where implementation of the Africa Energy Access Scale up Plan, discussed in Section 3 below, has commenced.

Table 3. Trends in WBG Support for Energy Access

Access and Blended Low Carbon/Access	*FY03*	*FY04*	*FY05*	*FY06*	*Total (FY03-06)*
Commitment (US$ millions)	258	153	562	547	1,520
Share of Total Energy Lending	10%	8%	20%	12%	13%

Source: World Bank.

9. ***With a strong low-carbon focus.*** The increase in low carbon investments is notable, both in absolute terms (millions of dollars) and in relative terms (share of energy sector lending) (see Table 2). The share of financing devoted to projects that support low carbon investments was 37 percent in FY06. This is partly due to increased demand for support for renewable energy and energy efficiency as these technologies have advanced and have

become more cost-effective (given price rise and greater volatility in oil and gas prices) and as emerging market governments adopt policies and regulatory frameworks that support renewable energy. The commitment that the Bank Group made in June 2004 at the Bonn International Renewable Energies Conference to scale up support for new renewable energy and energy efficiency by 20 percent per annum also provided focus on this portfolio.[1] To date, the Bank Group has exceeded this target[2]: in FY06 lending for new renewable[3] energy and energy efficiency at $668 million was more than double the Bonn target.[4] Leveraging of the GEF and Carbon Finance, ESMAP and ASTAE have also contributed to this result. Actions to further accelerate Prospects for further action in promoting low carbon solutions is outlined in Section 4 below. In addition to the support for small hydropower plants in the Bonn commitment, the Bank has increased lending for larger hydropower plants as well, drawing on the strategy established in the 2003 "*Water Resources Sector Strategy"* that set the stage for a renewal of lending for all size hydropower projects.

10. The Bank Group is initiating design for a system to: (a) estimate the impact of Bank activities in countries on their overall emission of Greenhouse Gases (GHGs); and (b) identify whether there are feasible opportunities to reduce this footprint while continuing to support growth and poverty alleviation. Helping our clients manage GHG risks through credible and transparent approaches to quantifying and reporting GHG emissions associated with development projects will enable them to identify and prioritize emission reduction opportunities, track progress over time, and participate more fully in carbon markets. This approach is consistent with the carbon disclosure practices of an increasing number of IFIs and major corporations.

11. The Bank Group is working closely with the donor community as well as the private sector through an outreach program to leverage each institution's efforts, including a series of conferences, workshops and media events (see Annex 1, Table A5). In addition to the importance of each individual event, the series increases the overall impact of the dialogue between the governments, donor community and the private sector to continue to find ways to leverage each other and work in partnership.

---

1 More details can be found in Energy & Mining Sector Board, Improving Lives: World Bank Group Progress on Renewable Energy and Energy Efficiency in Fiscal Year 2006 and prior annual report. They can be downloaded at http://www.worldbank.org/re or requested from energyhelpdesk@worldbank.org.

2 Partly in response to the growth target announced in Bonn in 2004, IFC looked closely at the contribution of its investments to sustainable energy and concluded that the Corporation's impact on energy efficiency was much greater than previously reported. As described in *Choices Matter*, IFC's 2005 Sustainability Report, the established practice was to identify only stand - alone projects whose sole focus was energy efficiency or renewable energy. In reality, the greatest impact of IFC's investments is through its mainstream investments -- e.g., upgrades to manufacturing equipment and infrastructure that substantially reduce energy consumption or allow the use of biomass fuels or other forms of renewable energy. With this in mind, IFC reviewed its FY05 portfolio and estimates its direct investment in sustainable energy was $221 million. Since this initial assessment, IFC has formalized its more comprehensive approach through its Development Outcome Tracking System and will be reporting its future sustainable energy investments on this basis.

3 New renewable energy comprises energy from biomass, solar, wind, and geothermal energy as well as hydropower with capacities up to 10 MW per facility.

4 This figure represents the Bank Group and includes GEF and carbon finance.

III. ACCESS TO ENERGY IN SUB-SAHARAN AFRICA

12. While acknowledging low energy access rates in some countries in all regions and the need for improved policies to optimize the impact of available public and private investments for access, the CEIF Progress Report to the Board of March 2006 highlighted the large shortfall in available funding in Sub-Saharan Africa (SSA). The paper noted that a target of increasing the percentage of households connected in SSA, from roughly 25% in 2005 to 35% in 2015 and 47% by 2030, is considered to be feasible if countries improve their sector policies and implementation capacity, and concessionary financing doubles from US$2 billion currently per year to US$4 billion a year. Input of the private sector, both in investment but also in articulating the demand for good governance and regulatory frameworks for the sector, continue to positively influence the sector. Under current investment programs, region-wide access rates are likely to fall short by about a third of the targets (see Annex 2). The program outlined below aims at generating donor interest and greater impact through harmonization with all private and public sector partners. Donor interest in the approach has been forthcoming. However, from the various consultations undertaking until now, little in the way of increased funding has materialized.

13. **A SSA Energy Scale-up Plan identified five parallel tracks** to address this shortfall: (a) scaled-up programs of household electrification (including grid reticulation and off-grid solutions); (b) additional generation and transmission capacity (including regional projects to lower costs); (c) provision of energy services for key public facilities such as schools and clinics to help meet MDGs; (d) provision of stand-alone lighting packages for households without electricity service; and (e) promotion of sustainable access to cleaner cooking and heating fuels. Scaling up of the program relies on both the international and domestic private sectors to be effective and sustainable and increased private and public partnerships is one of the critical inputs. The Bank's efforts to support this SSA Energy Scale-up Plan and leverage WBG resources is summarized below with details on deliverables, timelines, and results expected provided in Annex 1, Table A2.

14. ***Alignment and harmonization of donor support.*** The Bank undertook consultations with the donor community beginning in September 2006 to advance the access scale-up program. The scale-up levels targeted in this program require close coordination with the donor community to avoid overlap and draw on synergies. A key element of the program design is the implementation of a sector-wide programmatic approach (SWAP) in countries that have a favorable policy framework.[5] The Bank is piloting the approach in FY07 in Zambia and Senegal by assisting them to prepare medium-term investment plans for the electricity sector and by mobilizing donor and private sector financing. It is expected that the AfDB and bilateral donors will undertake similar assessments in other countries. A key output of a SWAP is a sector prospectus covering the first three tracks of the SSA Scale-up Plan that will identify projects and related policy and institutional changes needed to support this agenda. A policy framework that the government commits to implement will be identified to enable

[5] Consultations have already taken place with donors in Denmark, EU, France, Germany, Japan, Netherlands, Norway, Sweden, UK and USA. In addition, the SWAP approach has been discussed with representatives in Senegal, Kenya and Zambia. Other consultations will be continuing.

satisfactory self-financing to complement funding from the donor/IFI community. Targets and outcomes sought for household, public facilities and enterprise access and service levels will be established. Technical assistance will be used to set the policy agenda for implementation within the legal framework. The prospectuses will be prepared by the concerned implementing agencies, and be formally reviewed and endorsed by governments so that they are credible instruments to canvass donor and private financing. The Bank has advocated that its development partners take the lead in formulating SWAPs in countries where they have a substantial presence. They would take the lead in assisting countries formulate SWAPs and help prepare the sector prospectuses. The strategy is consistent with that of the World Bank's Africa Action Plan (AAP)[6] that emphasizes reinforcement of a country-based model of development centered on national sector wide strategies and donor division of labor under the IDA 14 partnership scenario. The Bank will continue to work closely with organizations such as NEPAD, AfDB, UNDP and other development partners including participation in regional initiatives such as the regional energy integration initiatives of the Infrastructure Consortium for Africa, led by the AU and NEPAD.

15. **Promoting the SSA Energy Access Plan WBG Operations** (scaled-up programs of household electrification and additional generation and transmission capacity). From approximately $500 million in each of FY05 and FY06, IDA commitments are expected to increase to $700 million in FY07 and up to $800 million in FY08. IDA projects for electricity access typically contain components to improve household access (while also connecting commercial and industrial consumers and public facilities) as well as components to increase electricity generation capacity and transmission lines. Investments components for household access cover network expansion and strengthening, off grid generation, and rural/off grid programs (in some cases with GEF financing). Projects typically include technical assistance for utility planning and operations and institutional and policy development. Some stand-alone projects finance specific national or regional capacity additions. There are, however, a number of risks associated with this program: conducive country environments are essential; possible dilution of the support for reforms from others would limit effectiveness; and the level of financing that will be available in IDA15 will be an important determinant in what levels of financing can be achieved. Expanding energy access and sustainable energy development in SSA is also a specific objective of several IFC programs, including the growing, regionally based Private Enterprise Partnership for Africa.

16. ***Electrifying Schools and Medical Clinics.*** In order to optimize opportunities to connect public facilities in grid expansion and off-grid program a guidance note for World Bank Task Team Leaders on the design and costing of electricity services for public facilities (medical clinics and schools) will be prepared in FY08. In addition, sector prospectuses are expected to include specific targets for provision of electricity services to public facilities, ensuring that the electricity access investment program for network expansion and off-grid is aligned with health and education programs.

---

[6] Meeting the Challenge of Africa's Development: A World Bank Group Action Plan.

17. ***Lighting.*** Building on IFC's "Lighting the Bottom of the Pyramid" project, the Bank and IFC has commenced a three year technical assistance program "Lighting Africa" to accelerate the up-take of modern lighting services by the mainly rural households and enterprises that do not have electricity access and that currently rely on kerosene lanterns and battery lighting. The program involves creating incentives for lighting equipment manufacturers and consumer goods retailers to develop and market rugged, low cost lanterns (CFL and LED based); developing standards for LED-based lamps and certification of solar lanterns; mobilizing CDM credits for distributed lighting; and forming a global lighting consortium to share development costs and market intelligence. Two lighting projects are under preparation for delivery in FY07 and IFC is providing support for private sector delivery of low-cost off-grid lighting projects in Kenya and Ghana with GEF support.

18. ***Cooking Fuels.*** In the case of sustainable fuelwood use for cooking, the Bank will work with development partners who are most active in this area, such as GTZ and the Netherlands. World Bank support for national and regional initiatives for sustainable forestry management (e.g. NEPAD's TerrAfrica program designed to build a coalition, share knowledge and cooperate in investment activity) will, in part, address barriers to sustainable forest management practices affecting the supply of wood fuel. This activity will be coupled with increased access to cleaner cooking stoves.

19. ***Outreach and Harmonization.*** The Bank will continue to work closely with organizations such as NEPAD, AfDB and other development partners including participation in regional energy integration initiatives of the Infrastructure Consortium for Africa that is led by the AU and NEPAD but that also includes the African Development Bank with a view to increasing and harmonizing donor assistance to countries. The World Bank and AfDB have put in place close working arrangements to intensify cooperation in project planning and design. In FY07 these projects include national and regional electricity generation & transmission projects and gas pipeline development (e.g. West Africa Gas Pipeline and the rehabilitation and further development of the Inga hydropower site in DRC).

IV. ACCELERATING THE TRANSITION TO A LOW CARBON ECONOMY

20. The Bank Group's strategy is to support, on demand from client countries, the development and financing of country low carbon energy strategies that promote diversification of energy sources to encompass a wider menu of lower carbon alternatives; to promote efficient use of energy; while assuring an energy platform that supports growth and poverty alleviation. Key to this is analytical work that assists countries in understanding options, coupled with investment support that capitalizes on the broad array of instruments available from the IBRD, IDA, IFC, MIGA, and from sources which have the capacity to buy-down incremental costs, including the GEF and carbon finance. The WBG strategy also provides for close cooperation with the Regional Development Banks and the IFI, so as to ensure that the strengths of each institution are maximized (see Box 1).

Box 1. IFI's Clean Energy and Development Agenda

The Clean Energy initiatives developed by each MDB within the Investment Framework reflect the specific nature of the climate change challenge within each region and the comparative advantage of each institution in terms of its policy leverage and financing instruments.

The **African Development Bank** (AfDB), along with other members of the Africa Infrastructure Consortium and the World Bank, is assisting with the preparation of the Africa Energy Access Plan. The AfDB is also helping to promote regional electricity markets in Africa via investments in transmission infrastructure to improve energy access. The AfDB has initiated the revision of its Energy Sector Policy which will now place greater emphasis on the financing of low carbon projects including renewable energy and energy efficiency projects, and is also developing its own Clean Energy Investment Framework to be presented to the board in April 2007. The AfDB is particularly focused on increasing the number of CDM projects in Africa. The AfDB also plans to participate in the preparation of adaptation screening tools, led by the WB, including the preparation of proposals for a National Adaptation Program of Action (NAPA). The AfDB is well placed to implement the NAPA in Africa.

The **Asian Development Bank** (ADB) has developed a Clean Energy and Environment program, which is made up of several initiatives. The first stage of the Energy Efficiency Initiative (EEI), which establishes the rationale for ADB investments and defines an action plan, was completed in June 2006. Operational details will be prepared in Phase II in consultation with its developing member countries (DMCs) through December 2007 and implemented in Phase III between 2007 and 2010. The EEI targets US$1 billion annual lending for energy efficiency, through a proposed Asia Pacific Fund for Energy Efficiency. ADB will invest $25 million in the Fund. The ADB is also developing the Carbon Market Initiative (CMI), a co-financing facility to boost the viability of alternative clean energy projects in its DMCs. As part of CMI, an Asia Pacific Carbon Fund will be established to provide up-front funding against the purchase of future certified emission reductions expected from projects. Given the high projected rise of automobile ownership in China and India, the Asian Development Bank is also developing an expertise in sustainable urban transport planning which was articulated in the Energy Efficiency in the Transport Sector Report.

In 2006, the **European Bank for Reconstruction and Development** (EBRD) launched the Sustainable Energy Initiative (SEI). Due to the high levels of energy and carbon intensity of the economy of many of its countries of operations, the EBRD has focused on energy efficiency both on the demand and supply side. The EBRD proposes through the SEI to more than double its energy efficiency and cleaner energy investments to €1.5 billion over the next 3 years by: (a) accelerating the pace of direct investment in energy efficiency projects across industrial sectors with the objective to reduce carbon intensity; (b) expanding the development and implementation of energy efficiency and renewable energy financing facilities to small and medium sized enterprises and to the residential sector; (c) contributing to the large investment requirement to develop cleaner energy supply in power and the natural resources sectors; (d) promoting, supporting and investing in the development of renewable energy capacity in its region of operations; (e) investing to reduce municipal infrastructure emissions with a particular focus on district heating and urban transport; and (f) supporting the development of the carbon market in the countries of operations, in addition to establishing the Multilateral Carbon Credit Fund.

The **Inter-American Development Bank** (IADB) has prepared its "Sustainable Energy and Climate Change Initiative (SECCI) which was approved by its Board March 1, 2007. The initiative is based on four pillars: 1) Renewable Energy and Energy Efficiency, 2) Biofuels, 3) facilitating access to Carbon Finance, and 4) Climate Change Adaptation. The SECCI aims to mainstream RE/EE into all projects, using as an example the EBRD's EE potential screening instrument. In collaboration with other IFIs the IADB plans to map RE potentials and to benchmark EE levels across its countries of operations. The SECCI also aims to scale up RE/EE technology deployment through innovation loans for research and development. The IADB is building up particular expertise in the area of biofuels.

The **European Investment Bank** (EIB) is working in partnership with the EU through a new Trust Fund to promote sustainable energy solutions for Africa. The EIB is also applying a number of instruments designed to mitigate greenhouse gas emissions, including: a €1billion financing facility; technical assistance to encourage development of JI/CDM credits; and the promotion of two carbon funds with IBRD and EBRD. The EIB is also beginning to screen projects for adaptation purposes, and is exploring the need for new financial and analytical approaches in this respect.

In its annual World Energy Outlook 2006, the **International Energy Agency** (IEA) presented an Alternative Policy Scenario (APS) to address energy security and environmental concerns. Developed in co-operation with the World Bank and other IFIs, the APS offers practical guidance to policy makers about the effectiveness and economic consequences of policy options. In 2006, the IEA published "Energy Technology Perspectives", which shows how global CO_2 emissions could be brought back to around their present level by 2050 through accelerated deployment of cleaner energy technology that is either already available or under development. The IEA has a major work program to identify "best practice" policies for promoting lower carbon technologies in all the key areas that have been identified, including energy efficiency. This includes power plant performance, especially for coal plant, and CCS, as well as defining the concept of "CCS capable". The World Bank is co-operating closely with the IEA.

21. **The GEF is the largest source of grant financing for energy efficiency and renewable energy,** with cumulative commitments through the World Bank of approximately $1.5 billion since 1992. GEF financing has had the greatest potential for market transformation of these technologies in cases where technical assistance and limited provision of financing for incentives has been applied to reform policies, transfer specific technologies to well-organized recipient industry, or to create clean energy incentive programs. The WBG is a pioneer in international carbon finance activities by developing methodologies approved by the CDM Executive Board and utilizing public and private sector investments to finance a wide range of sectoral activities, which heavily leverage private sector investments (see Box 2). In addition, IFC has developed new financial products for the carbon market leveraging its own balance sheet. With GEF support for technical assistance and partial risk guarantees, IFC has also successfully engaged local banks in Eastern Europe, Russia, and China to provide commercial lending for well over $100 million in clean energy investments. IFC is exploring the possible use of internal resources to expand the range of commercially feasible investments in clean energy options within its investment portfolio.

Box 2. World Bank Group Support for Private Sector Participation in Low Carbon Projects

The WBG has a range of instruments to support private sector participation in low carbon projects: IFC lending and investment products for the private sector, GEF and carbon financing, as well as Bank guarantee instruments for both debt and equity. The following are three examples of such interventions:

The **Nam Theun 2 Project** in Laos is designed to provide 1,070 MW of renewable energy supply of electricity to both Thailand (995 MW) and Laos (75 MW). The project is sponsored by Electricite de France, the Italian-Thai Development Public Company Limited and Electricity Generating Public Company of Thailand. Total project cost is estimated to be $1.45 billion, including contingencies, with $450 million of equity financing and $1 billion of debt. The international dollar lenders to the project indicated that without adequate political risk mitigation, they would not be able to support the international lending package. The World Bank Group and Asian Development Bank cooperated in providing the multilateral guarantees and modest direct lending needed to bridge the financing gap.

In partnership with GEF and donor countries, the **IFC is helping local financial institutions fund renewable energy and energy efficiency** (RE/EE) projects in Eastern and Central Europe, Russia and China as part of its response to climate change. The IFC program provides a variety of services and financial resources to local banks and companies that invest in new technologies. The program consists of: advisory services to banks and borrowers on RE/EE projects; lines of credit and IFC/GEF partial guarantees for local banks and leasing companies; facilitating partnerships between local banks, project developers; standardized transactions for banks and developers. As of June 2006, a $70 million portfolio of RE/EE projects has been funded, including: small scale hydropower; building retrofits to improve their energy efficiency; biomass-fired boilers; and energy efficiency in schools.

The US$108 million in **IDA credits to the Indian Renewable Energy Development Agency** (IREDA) for renewable energy financing and institutional development support leveraged nearly US$200 million in co-financing from the private sector. The India Renewable Resources Development Project contributed to increasing renewable energy share of power generation capacity in India from about 0.1 percent of total generation capacity in 1992 at project effectiveness to 3 percent by March 2001 at project end. With additional parallel financing from developers and other commercial financial institutions, nearly 3,000 MW of wind, small hydro, biomass and solar photovoltaic power systems were in operation by March 2001, compared to about 100 MW in 1992. By the end of the project IREDA had committed financing of Rs. 47 billion to nearly 1500 projects accounting for 1,720 MW. Subsequently the Bank approved a follow-on project, Second Renewable Resources Development Project that provides IREDA with financing from an IDA credit and IBRD loan of US$130 million to support small hydro and energy efficiency investments that leveraged an additional US$170 million from other sources. With additional parallel financing from the private sector, as of March 2006, IREDA had approved 1,783 renewable energy and energy efficiency projects, committed Rs. 74.5 billion in loans (about US$1.5 billion) to support clean energy capacity of 2,707 MW that annually displaces 1.3 million tons of coal equivalent.

22. The GEF and the WBG have identified four broad areas of collaboration with respect to the Transition to a Low Carbon Economy: Policy Transformation; Clean Energy Country Case Studies; Clean Energy Technologies; and Private Sector Engagement (Annex 5). The Bank has taken the lead in some areas and the GEF in others. These initial undertakings are necessary to lay the foundation for more ambitious future collaboration. The Bank/GEF portfolio comprises several projects that could serve as the foundation for scaling-up the transition to a low carbon economy, particularly in the G+5 countries, including: (a) transformation of the renewable energy markets in China and Mexico; (b) barrier removal to energy efficiency investments in China; (c) rehabilitation of inefficient coal-fired power plants in China and India; and (d) long-term modal shifts to more energy-efficient modes of urban transport in China, India, Brazil and Mexico.[7]Scale-up of such low-carbon initiatives would require a reduction in transaction costs and predictability of funding in the GEF, as well as better integration of GEF co-financing within the Bank's country programming.

23. **Consistent with its private sector focus, the IFC is also promoting greater investment in sustainable energy through a range of mechanisms and initiatives.** These include sustainable energy strategies within several investment and regional departments, the creation of a dedicated carbon trading unit, advisory services to help establish successful frameworks for clean energy markets, and donor-supported new energy technology commercialization projects. An IFC reporting and tracking system has been established to identify clean energy components within investments, leading to a substantial increase in the amount of such activities identified.

24. It is expected that the WBG's low-carbon portfolio, today at 37% of the overall energy portfolio, will continue to grow covering a wide range of interventions. These will include renewable energy projects (including large hydropower plants), energy efficiency, rehabilitation of existing power plants to reduce emissions, district heating projects, biomass waste fueled power projects, gas flaring reduction and high efficiency coal-fired plants (super-critical and ultra-supercritical thermal plants). If opportunities and ways to mobilize grant or other funding to finance incremental costs emerge, the World Bank Group would consider partnering with the private sector on piloting IGCC and Carbon Capture and Storage technologies. Finally, the World Bank Group will continue to increase its funding by at least 20% per year until FY09 for energy efficiency and new renewable energy, as per the bond commitment. It will also engage more fully in the transport sector (see para 25).

25. **The overall goal is to support the transition to a low carbon economy by scaling up analytical, knowledge and investment support.** The Bank Group's Action Plan, outlined in Annex 1, Table A3-1 to A3-3, includes: (a) the further development and implementation of sector strategies for energy efficiency, renewable energy and transportation; (b) implementation of low-carbon projects funded by IBRD/IDA, IFC, GEF and carbon finance, often together, and with an emphasis on leveraging the private sector; (c) a series of country case studies for the G+5 countries (Brazil, China, India,

[7] Appendix 2 summarizes low carbon activities in Brazil, China, India and Mexico, including GEF projects

Mexico and South Africa) to assess the opportunities to transition to a low carbon economy, followed by the development of a set of Action Plans for potential implementation,[8] and (d) facilitating the further development of the carbon market, and innovative ways to combine existing financial instruments. Highlights include:

- Completion of an *Energy Efficiency* Scale up Action Plan which aims at mainstreaming a broader, multi-sector set of energy efficiency "business lines". This will enable continued scale-up of WB lending and impact. A study on energy efficiency indicators has been launched jointly with the IEA and the support of other IFIs.

- Investment and analytical support for *decreasing emissions from thermal energy sources* will also be pursued. These interventions will include a mixture of: thermal power plant rehabilitation; upgrading of efficiency of new thermal power plants; early retirement of inefficient plants with state-of-the-art facilities; support for carbon capture and storage; gas flaring reduction; and methane release reduction. Specific projects are already under preparation for thermal power plant upgrades in India and China. The Global Gas Flaring Reduction program has been instrumental in mobilizing US$1.7 billion of private capital investments for gas flaring reduction projects.

- Investments, policy support and training, capacity building, and knowledge dissemination are key activities to increase the use of *renewable energy*. Economic Sector Work (ESW) and Analytic Advisory Services (AAA) are under way, with the support of ESMAP, to strengthen the policy and institutional frameworks for developing long-term energy development plans, including formulating laws and regulations for encouraging greater use of renewable energy. Hydropower investments will include rehabilitation of existing plants, small and run-of-river plants and multi-purpose hydropower plants with reservoirs. These types of projects can demonstrate the significant impact that partnerships between WBG, government, and the private sector in this effort.

- The SD Network is exploring a framework for piloting activities that would reduce emissions from *deforestation* and degradation, using a system of policy approaches and positive incentives. The proposed fund would set the stage for a future, large-scale carbon market by building countries' capacity to harness the future carbon market and piloting performance-based payments for avoided emissions improvements in natural resource management, in particular forest management.

- Activities in the *transport sector* in FY07-08 will reflect the update of the Bank's Transport Strategy (under preparation) which will cover the issue of greenhouse gas emissions from transport as a priority for Bank action in the

[8] The Action Plans will assess low carbon options and prioritize them, determine a low carbon development trajectory, analyze the incremental cost and develop a financing plan. Implementation will require concessional, grant and carbon financing.

sector. At an operational level this will involve greater attention to urban transport, including provision of urban public transport and management of demand by private vehicles; and greater engagement in non-road based transport modes including railway and waterway transport. Guidance notes are also planned to sensitize transport staff to transport and carbon relationships, to provide tools that will enable the incorporation of energy efficiency and emissions into project appraisals, and advice on policy implications and options for transport policy makers in partner countries.

- As part of the broader work in bio-energy, the WBG is looking at the feasibility and economic viability of bio-fuel programs in developing countries. Economic assessments of alternative fuels will be conducted, including assessments of trade policies for liquid bio-fuels and bio-diesel in Brazil. Bio-fuels case studies will be conducted in two African countries and a bagasse cogeneration project is under prepration in Brazil with the cooperation of the sugar producers association.

26. ***Strategic Support at the Country Level.*** Over the next two years "Low Carbon Country Case Studies" will be completed for the +5 Countries, China, India, Brazil, Mexico and South Africa[9]. Country ownership of these programs will be pivotal to the CEIF to transition from a broad-based global analysis to implementation.[10] Initial steps are underway in each country, with progress varying depending on the starting point and political support. Each study will include an assessment of which sectors provide the best opportunity for greenhouse gas reductions, which technologies are most appropriate, what policies may need to be changed and what are the incremental financing needs. The analysis in each country will vary, depending on current levels of GHG emissions, opportunities for their reduction and the support and capacity for implementation within each country. An important component of the transition is ownership of the low carbon investment programs by country Governments. Implementation will follow after a broad consensus on the low carbon program is reached with governments and civil society and financing of the incremental global costs are quantified and quickly mobilized. Many critical opportunities to transition to a low carbon economy may be missed due to inadequate GEF and carbon financing, including the development and commercialization of critical climate-friendly technologies, e.g., integrated gasification combined cycle (IGCC) coupled with carbon capture and storage (CCS), and the promotion and scale-up of sector and programmatic CDM approaches. ESMAP has established a multi-donor trust fund to support the analytical work for the Low Carbon Case Studies and related capacity building, analyses, and outreach.

27. In parallel with the development of the Country Case Studies, work on a growing pipeline of investment projects, many with GEF and/or Carbon Finance support will continue to be pursued. The specifics of ongoing and low carbon activities in the +5 countries are given in Annex 3. Finally, on request and through the Country Assistance

[9] The India and China studies have already been initiated, while the Brazil and Mexico studies are waiting confirmation by the new governments.

[10] The focus on the G+5 countries is because of the magnitude of their greenhouse gas emissions.

Strategy process, the Bank would work with other countries to develop low carbon strategies and provide investment support. IFC is also actively working to increase its sustainable energy investments in the +5 countries.

28. ***Supporting the Development of the Carbon Market and other Financing Mechanisms.*** A key goal of the CEIF is to accelerate development of low carbon investments through the mobilization of funding which can spur innovation and help fund the incremental costs of investments. The Action Plan includes a number of activities which aim to promote innovation in the area of financial products, while supporting the further development of the Carbon Market. The latter goal recognizes the uncertainties in the carbon market in the absence of a post-2012 climate regime.

29. ***The WBG and Carbon Finance.*** The CEIF has stimulated expansion of efforts by the WBG to facilitate the expansion of the carbon market through: (a) analytical work and capacity building efforts; (b) developing new methodologies and testing new approaches to structuring and financing carbon asset creation; and (c) further growth of its diverse portfolio of CDM and Joint Implementation (Annex 4). Carbon finance in the World Bank comprises 10 funds with US$1.86 billion under management, including such experimental funds as the Bio Carbon Fund (piloting forestry projects) and the Community Development Carbon Fund (delivering benefits to poor communities). Carbon finance is now emerging into the mainstream of the Bank's traditional lending business with about 40 percent of its transactions linked with IBRD/IDA operations. This is important because integration of carbon finance opportunities in development planning and the Bank's country dialogues will facilitate movement from current, short-term project-by-project approaches to include sectoral and investment programming approaches resulting in larger scale and more efficient reduction of carbon emissions and greater revenues in developing countries.

30. With the development of the CEIF, the WBG has also increased efforts to help address the most significant barriers to scaling up market-based emission reductions. These include the regulatory uncertainty with regard to the climate regime post-2012; the need for the current regulatory framework to evolve further, refocusing attention from a narrow accounting of tons of emission reductions towards a system of recognition and rewards that promote low-carbon trends; and inclusion of important climate-relevant activities which are outside of the reach of the carbon market such as large-scale deforestation and other land-use practices, and carbon capture and storage activities. In addition, the WBG continues to establish innovative means of enabling poorer developing countries with low fossil energy use or problematic investment conditions to benefit from the carbon market.

31. **Bank-managed carbon funds are supporting low-carbon investments in a wide variety of sectors,** ranging from the destruction of industrial gases to the capture of methane in landfills, improved energy efficiency in steel production, bagasse cogeneration, renewable energy (wind, geothermal, hydropower) and land use change and forestation. The total amount of carbon finance funds under management is currently $1,860 million, of which $1,412 million has already been committed, with the remaining funds expected to be committed for a wide range of low-carbon projects in FY07-09. To date, almost 430 million

tCO2e have been contracted from 60 projects. IFC also has $190 million under management in partnership with the Government of Netherlands, of which about $50 million has already been committed in 6 projects, and the balance is on track to be committed in FY07. Details of the projects underway and in the pipeline are in Annex 4.

32. **The Bank Group continues to facilitate the expansion of the carbon market by developing new methodologies and testing new approaches** to structuring and financing carbon asset creation[11] (Annex 4). The Bank's Action Plan (Annex 1 Table A3-3) includes:

- designing a *new carbon facility that would purchase emission reductions beyond the current regulatory period* of the Kyoto Protocol, emphasizing programmatic and sector-based approaches that would deliver significantly larger reductions in GHG emissions and promote scale-up of lower-carbon development paths—ensuring continuity in the carbon market while international negotiations of a post 2012 regime continue under the UNFCCC;

- providing the experience that could assist regulators in developing a legal, regulatory, and institutional framework for international greenhouse gas emissions trading, with a focus on *green investment schemes in ECA*[12] which will channel the revenues from emissions trading to further emission reducing activities;

- developing market-based mechanisms to provide incentives to *avoid deforestation*;

- identifying mechanisms through which programmatic CDM can promote the implementation of *energy efficiency* standards and labeling programs in developing countries;

- assisting client countries in developing mechanisms to improve carbon price discovery through the use of *auctions* of emission reduction credits (e.g. Brazil cogeneration);

- developing due diligence and processing guidelines for carbon funding operations; and

- promoting a new IFC product, the Carbon Delivery Guarantee, to guarantee delivery of carbon credits from projects in developing countries, to companies

---

11 The current Kyoto Protocol contains no obligations beyond 2012 - the methodologies being developed by the Bank could assist in developing a future regulatory regime which will likely contain a trading mechanism for carbon.

12 Green investment schemes refer to trading the "excess" emissions from countries with economies in transition, i.e., those countries where current emissions are below their Kyoto allocations, combined with the "greening" of these trades through real, carbon-reducing investments, which back the environmental credibility of the traded AAUs.

and financial institutions in industrialized countries thereby enhancing the value for sellers while eliminating project delivery risk for buyers.

33. ***New Financial Instruments.*** Ideas for several additional instruments were introduced in the paper presented to the Development Committee at the Annual Meetings in Singapore in September 2006 titled "*An Investment Framework for Clean Energy and Development: Progress Report"*. There was mixed reaction to the proposals for new financing vehicles, with the message being that before pursuing work on these, the WBG should concentrate on maximizing the use of existing instruments. Thus this Action Plan concentrates on extending and a scaling-up of instruments that exist in the WBG today. At the same time, the Development Committee suggested that the Bank work on (in close coordinating with the GEF) further exploring financing options so as to provide incentives and resources to countries to pursue clean energy alternatives and consider new means and mechanisms to make pricing of existing instruments more transparent and competitive. The Action Plan developed above includes a program to reach out to concerned countries (through the Country Case Studies) and the private sector (for example, via the Private Sector Forum, March 14, 2007 co-sponsored with EBRD, the World Economic Forum and the World Business Council on Sustainable Development). This will help us improve our understanding of what type of financial instruments, beyond those in place today, might accelerate development and adoption of low carbon technologies. The work to explore ways to make pricing of existing instruments more attractive, via blending and other means, is being conducted through the ongoing Task Force under the Middle-Income Strategy work plan. Thus, consideration of new financial mechanisms may emerge again as lessons are learned and as part of the work being undertaken on the needs of Middle Income Countries.

V. ADAPTATION TO CLIMATE VARIABILITY AND CHANGE

34. Climate change has serious implications for the Bank's poverty reduction efforts. It will impact on areas of major economic and social importance for developing countries, such as water availability, agriculture, health, the durability of major infrastructure, and the sustainable use of natural resources. The Bank's long-term approach towards country assistance, project selection, siting and design decisions will all be affected by changing climate circumstances peculiar to each country. The Bank has been a leader in tackling adaptation, with pioneering projects undertaken in low-lying islands in the Caribbean and Pacific, mountain zones in Latin America, and rural areas in South Asia. The focus now is on expanding our knowledge of climate risk management, pioneering the application of this knowledge through practical application in Bank operations, and building a more comprehensive set of tools and guidance to establish standards of best practice.

35. Resources, staffing and activities related to adaptation have grown rapidly since the initial work on the Clean Energy Investment Framework began. Adaptation related activity within the IBRD/IDA has increased from only about ten projects and AAA before the CEIF, to about 40 projects (loan and grant) in 30 countries and 25 TAs/AAA

underway or planned. Ten GEF grants totaling $49 million have GEF Chief Executive Office approval or are in the pipeline in FY06/07 (up from two projects worth $0.5 million in FY04/05). Along with the growth there has been an important shift from technical assistance based on vulnerability assessment and capacity building to piloting of projects to implement adaptation activities. A network of specialists throughout the WBG is undertaking this work. Sustainable development sector specialists throughout the Regions, WBI, DEC and Anchor are working with the Global Facility for Disaster Reduction and Recovery (GFDRR) in the closely related field of disaster risk reduction. Joint IFC and Bank work is underway to assess the changes that might be needed to account for changing climate risks in due diligence procedures in major infrastructure projects. The IMF, IFC and the WB are cooperating to assess the financial implications of climate proofing development on national development plans.

36. Mainstreaming adaptation to climate risks into the day-by-day activities of the IBRD Group is the core focus of the work program. Funding for scaling up adaptation work will be a challenge. In the short term, GEF resources for adaptation will be critically important. These funds are limited, amounting to a commitment of about $110 million out of total of $230 million of available funds to date.[13] This is expected to improve as the Least Developed Country Fund moves from assessment of priorities to implementation and the Adaptation Fund (resourced by a tax on CDM activities) becomes available. In the long term, the scaling up of financial assistance for adaptation will occur through IBRD lending and IDA credits/grants and similar sources of international finance, which support otherwise conventional sectoral projects, but which are designed and implemented taking into account adjustments necessary to adapt to climate change. For example, a water resource development project financed by IBRD is likely to look very different in the future once the rainfall, flood, and drought conditions resulting from climate change are taken into account (see Box 3).

[13] Made up of $50 million in the Special Priority for Adaptation (SPA) from the main GEF Trust Fund; $60M in the Special Climate Change Fund (SCCF), and about $120 million in the Least Developed Countries Fund (LDCF). The size of the Adaptation Fund, which is resourced by a tax on CDM transactions, is uncertain but is expected to be at least several hundred millions dollars over the first commitment period.

Box 3. Examples of Adaptation Projects Designed to Address Climate Change Risk

Columbia National Adaptation Project: This World Bank–GEF will support Colombia's efforts to define and implement specific pilot adaptation measures and policy options to meet the anticipated impacts from climate change. Project activities include maintenance of the hydropower generation ability of the Amaya River watershed; enhanced public health program incorporating measure to meet the increased threats from dengue and malaria; and incorporation of adaptation into regional development plans for the Las Hermosas Massif and for the Colombian Caribbean insular areas, including enhanced management of key marine ecosystems and reduced vulnerability in water supply to local communities.

Kenya Adaptation to Climate Change in Arid Lands Project: The first phase of the IDA-funded Arid Lands Resource Management Program (ALRMP) in Kenya was successful in addressing short term impacts of climate variability but was not able to address the longer-term impacts of changing climate. The number of people affected by droughts and floods in Kenya is doubling every decade. The new GEF-funded program will integrate climate change into the second phase of the ALRMP which is expected to initiate support for 200 to 300 communities each year. The GEF resources will be used to increase institutional capacity to plan for climate change by improving information flows and analytical capacity; promote public and private investment through incentives for appropriate investment; and increase community resilience by trialing and demonstrating alternative livelihood options through community based micro-projects.

37. **The adaptation work program is designed to enable the WBG to scale up assistance to developing country clients** so that they can implement measures to adapt to the social and economic impacts of climate change. This requires three parallel and inter-related programs of activities to: (a) understand the nature and degrees of risks; (b) building capacity to manage risks; and (c) invest in adaptive measures to minimize and mitigate risks. The Action Plan (Annex 1, Table A4) includes the following components:

- ***Climate Risk Assessment.*** This component will deliver robust and easy to use information and tools for assessing development projects and programs for potential sensitivities to climate change to Bank and client country staff. Components include: (a) a core set of commonly needed current and projected climate data so that decision making can focus on responses and not data collection; and (b) a screening tool to identify the threats and opportunities arising from climate variability. This work will be closely integrated with the Global Facility for Disaster Risk Reduction (GFDRR) to draw upon the long experience of dealing with sudden onset disasters while strengthening the ability of countries to adapt to extreme as well as chronic climate change impacts.

- ***Developing Good Practice Guidance and Capacity.*** A series of analyses will be undertaken to build a body of good practice guidance on managing climate risk through a series of country-level studies and in a few crucial development sectors, i.e. water & agriculture, major infrastructure, and large coastal cities.

  - A wide variety of *country assessments* will be undertaken and include the effects of different climatic conditions on the main sectors of the economy and a review of institutional capacity to manage the climate vulnerability. They will build on existing in-country or Bank-led initiatives and will be designed to identify specific, achievable, prioritized actions. Particular attention will be given to "low-hanging fruit" opportunities, as well as

institutional and governance bottlenecks for the implementation of adaptation measures. Countries and regions have different vulnerabilities to climate change, e.g., changes in water resources will be particularly important in arid and semi-arid regions in SSA and MNA, while sea level rise will be important for low lying deltaic areas and small Island States. Countries under consideration include Tanzania (water-agriculture sector); Papua New Guinea (CAS preparation), and Nepal and Mozambique (all sectors at risk and carried out in association with the GFDRR supported Country Studies of Disaster Risk Reduction).

- The *agriculture-water sector analysis* will assess climate change risks in different watersheds across regions, critical institutional issues and bottlenecks that may delay or impede effective adaptation at the sectoral level; and capacity needs and capacity maintenance issues at all institutional levels (from the national to the local/community levels).

- In cooperation with IFC, changes in appropriate due diligence procedures and the need to modify standards and codes of practice to take into account climate change on major *infrastructure* projects will be assessed.

- The Asian Development Bank and World Bank will assess the impacts of climate change in several large Asian *coastal cities* in terms of local and national economic growth, as well as regional and global economics. Four or five cities will be studied in greater detail to identify and prioritize adaptation measures through "hard" and "soft" structures, technological needs, and shifts in development planning and implementation.

- The role of *insurance and other modes of risk transfer* as a means of reducing vulnerability to climate change will also be assessed. The WBG is pursuing three projects which seek to provide governments with risk spreading and liquidity management tools: the IFC/IBRD joint Index Re project, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), and the Global Catastrophe Risk Facility (GCRF). On a more local level, the Bank will build upon experience in India, Mongolia, Malawi and Morocco to refine the ways in which insurance can be best delivered to communities to manage weather risk.

- ***Investments in Climate Risk Assessment and Adaptation.*** A number of projects have been programmed to address known risks to climate change. The lessons from these investments together with the results of a series of pilots directly linked to Bank operations will provide guidance on how to approach climate risk in upstream analytical and planning processes as well as in the project/program implementation phase (i.e. how to "climate proof"). Much of the work focuses on agricultural and water issues and rural infrastructure as these are fundamental to poverty reduction in most regions of the world, very vulnerable to climate risks but have had less work done on them than the more spectacular climate threats such as sea-level rise, wind

storms etc. The countries have been identified with the first SSA study underway (Kenya arid lands management, see Box 3). The other countries where such work is being planned includes Tanzania, Senegal, Burkina Faso, Niger, China and Colombia.

VI. Measuring Results

38. The Action Plan includes a number of knowledge, new product development and investment activities and actions. Results will be measured by a mixture of input (program delivery), and output and outcome indicators. The baseline output and outcome indicators for country programs will be built into the particular sector programs. A good practice note for Task Team Leaders defining indicators will be issued in FY08. Indicators would include:

A. Action Plan Program Delivery indicators would include:

A.1. Bank Group Energy Deliverables

- New Products (tools, refinement/expansion of financial instruments)
- Country level AAA and Lending delivery
- Sector level QAG, IFC DOTS, and IEG Ratings
- Percent of total energy lending for energy efficiency and renewables
- Percent of total energy lending for low carbon activities
- Percent of total energy lending in low electricity access countries
- Improvements in the regulatory system governing energy generation, transmission and distribution of electricity.

A.2. Leveraging the Private Sector

- Total amount of private capital mobilized to support energy investments
- Increase in the share of private sector participation in energy distribution, transmission and generation via effective PPP arrangements
- Percentage change in the amount of private capital mobilized to expand energy access in SSA

A.3. Adaptation

- Growth of dedicated Adaptation AAA and projects

- Integration of climate variability and change considerations in broader WBG portfolio

- Development of new financial tools to mobilize private capital into adaptation agenda

- Development of PPP arrangements in climate and disaster risk management

B. Output and Outcome Indicators will be embedded in relevant country strategies and projects, and would include:

B.1. Energy for Growth and Poverty Alleviation

- Increase in access to electricity services

- Energy Affordability for low income households

B.2. Transitioning to a Low Carbon Economy

- Decreases in Energy Intensity (energy as a % of GDP)

- Reductions in GHG emissions (over a baseline of business as usual projections)

B.3. Adaptation

- Projects which are resilient to climate variability and change

VII. RESOURCE IMPLICATIONS

Financing the Implementation of the Action Plan

39. To make meaningful progress in all three pillars will require a significant increase in financing. The WBG will work with partner countries to create the environment for competition and private sector financing. Available financing support is still insufficient to support the Africa Action Plan to increase access of modern energy in Sub-Saharan Africa, to provide a significant buy-down of the incremental costs of a transition to a low carbon economy, or to climate-proof development at scale.

- To scale up energy access in SSA from 25% today to 35% in 2015 and 47% in 2020 would require increasing concessional financing from about $2 billion per year to $4 billion dollar per year. Scaling up of the program relies on both the international and domestic private sectors to be effective and sustainable, and increased private public partnerships. A strong replenishment of IDA-15, accompanied by additional donor concessional financing will be essential.

- To transition to a low-carbon economy will require mobilization of significant amounts of grant, concessional or carbon financing for developing countries, i.e., tens of billions of dollars per year. Strategic partnership with the GEF will support continued growth in the low carbon portfolio and leverage private finance. Beyond the WBG programs, a long-term stable equitable regulatory framework could mobilize $20-120 billion per year in carbon financing.

- Significant financial support, which could come from grants and ODA, would be required to assist client countries adapt to climate change, that is to say, to make development more resilient to climate variability and change.

World Bank Group Resources

40. The Action Plan contemplates a number of global activities (knowledge, tools, new product development, and outreach) and country activities (AAA and lending).

41. ***Global activities*** will be carried out by the Bank's SDN Anchor and IFC CES Departments, drawing on knowledge and staffing in the Regions. The SDN has already reviewed and implemented budget redeployment starting in FY 06. Remaining opportunities will continue to be assessed before requesting increases in the budget. Anchor budget for these activities is expected to increase from about $2.5 million/year in FY06 to about $3 million/year in FY07-08. IFC estimates that the group will devote about $0.5 million/year to this Action Program.

42. ***Country Activities.*** Country and Regional level activities will be embedded in Bank Country Assistance/Partnership Strategies and IFC strategic programs. The Action Plan reflects expected regional and country strategies and lending pipelines. Resource requirements are being built up as part of the FY08 budget exercises. Resource implications are therefore not fully known at this time, but are expected to run at $10-12 million/year. Regions will be making efforts to redeploy resources, but will likely also need incremental resources to support the scale up. Details would be outlined in the upcoming WBG strategy and budget documents. Although much of these increased costs will be funded by Bank budget, they will also need to be complemented by donor funding.

43. ***Donor support*** for knowledge and TA work will be critical. We are seeking to mobilize around $6-8 million/year from donors. Support will largely be directed through ESMAP and ASTAE, where multi-donor trust funds have been established to support global knowledge development and to fund country studies; PPIAF which will continue to support improvements in policy frameworks so as to promote private-public partnerships and the IFC's infrastructure Advisory Services which will among others work to enhance transactions. Opportunities to attract the private sector in addition to donors will be pursued.

44. Other facilities, such as the Global Facility for Disaster Reduction and Recovery, will support related activities. A funding estimate is not yet available, but a Global

Forestry Alliance is also under consideration which would support sustainable forestry while laying the groundwork for the program on avoided deforestation.

ANNEX 1. THE ACTION PLAN MATRIX

Table A1. Summary Table for WBG Clean Energy Investment Framework

Impact	*Strategy, Knowledge and Policy*	*Project Investments and Lending*	*Measuring Results*
Total Energy Program *Energy for economic growth and poverty alleviation, in an environmentally and socially sustainable manner*	Country level policy and regulatory support to improve financing prospects and scale up investments.	Total energy lending/investments projected to increase from $7 billion (FY03-05) to over $10 billion (FY06-08).[1]	• New Products (tools, refinement/expansion of financial instruments) • Country level AAA and Lending delivery • Sector level QAG, IFC DOTS, and IEG Ratings • Increase in reliability of electricity • Energy Affordability for low income households • Total amount of private capital mobilized to support energy investments • Increase in the share of private sector participation in energy distribution, transmission and generation via effective PPP arrangements.
Increasing Energy Access in Sub Saharan Africa *Improve electricity access region-wide to enterprises, newly populated trading areas and households with positive impact on economic growth and household welfare.*	Target of increasing electricity access to 29 million more people in SSA by 2015. Activities outlined in Table 2.	Lending/investments for energy in SSA by the World Bank are projected to increase from $1.2 billion (FY03-05) to about $2 billion (FY06-08). Meeting targets requires increased funding from about $2 to $4 billion/ year.	• New Products (tools, refinement/expansion of financial instruments) • Country level AAA and Lending delivery • Sector level QAG, IFC DOTS, and IEG Ratings • Percent of total energy lending in low electricity access countries • Improvements in the regulatory system governing energy generation, transmission and distribution of electricity. • Increase in access to electricity services • Energy Affordability for low income households • Percentage change in the amount of private capital mobilized to expand energy access in SSA.
Lowering Carbon Emissions *Reduce carbon footprint through strong program of analytical work and scale-up of low carbon investments.* *Extend financing to buy-down incremental costs via new methodologies and mechanisms for carbon financing.*	Activities outlined in Table 3a, b, and c.	Lending/investments for low carbon projects projected to increase from $2 billion (FY03-05) to over $4 billion (FY06-08).	• New Products (tools, refinement/expansion of financial instruments) • Country level AAA and Lending delivery • Sector level QAG, IFC DOTS, and IEG Ratings • Percent of total energy lending for energy efficiency and new renewables • Percent of total energy lending for low carbon activities • Total amount of private capital mobilize into low carbon investments. • Growth of the carbon finance markets and percentage of private sector participation (buyers and sellers) • Decreases in Energy Intensity (energy as a % of GDP) • Reductions in GHG emissions (over a baseline of business as usual projections)
Adaptation *Scale up opportunities to implement screening tools, mainstreaming pilots, financing mechanisms, adaptation awareness and results dissemination at the country and global levels.*	Activities outlined in Table 4.	GEF grant financing ($50-60 million) expected to leverage about $500 million in WBG investments (FY06-09)	• Growth of dedicated Adaptation AAA and projects • Growth in coverage of adaptation in broader WBG portfolio • Development of new financial tools to mobilize private capital into adaptation agenda (e.g., global index insurance facility, weather index insurance). • Development of PPP arrangements in climate and disaster risk management.

[1] Total numbers include SSA and Low Carbon projected estimates.

Table A2. Increasing Energy Access in SSA

Goal: Increase Access to Electricity in Sub-Saharan Africa from about 25% to 35% by 2015 and 47% by 2030 **Results: At least 30 countries increase generation capacity by > 20% and utilities in 20 countries reduce losses by 10% or better**			
Impact	***Strategy, Knowledge, and Policy Deliverable***	***Project, Investments, and Lending Deliverables***	***Comments***
Alignment and harmonization of donor support *Preparation of sector-wide programs (SWAPs) as first step towards implementing the five track program, to make more efficient use of donor funding.*	FY07/08: Country assessments and preliminary work on access cost estimates in two pilot countries (Senegal and Zambia) FY08: SWAPs and prospectuses prepared for two pilot countries: Senegal and Zambia. Mix of donor, IDA and ESMAP resources required to develop SWAPs and prepare sector prospectuses.		Results will depend on conducive country environment essential for all interventions: willingness, ability, and capacity to adopt policy and institutional reforms Donor capacity to assist countries formulate SWAPs and prepare sector syndications may be limited.
Mainstream SSA Energy Access Plan *Bank will set targets in projects for improved household access and additional commercial and industrial consumer connections.* *Region-wide performance milestones: at least 30 countries increase generation capacity by 20% or more (FY07- FY11) and utilities in 20 countries reduce their losses (technical and non-technical) by 10% or better by FY11*	Approx. $0.5 million/year in AAA activities to support diagnostic and capacity building interventions to improve policy development update legal framework and strengthen public utilities. FY07/08: Disseminate sector wide approach (SWAP) principles and promote discussion and adoption of approach among SSA countries. FY 08/09: GIS based methodology for least cost grid planning being (piloted in Kenya and Senegal) will be disseminated region-wide.	FY07-FY10: IDA plans to prepare about 10 investment projects/year (between $700 and $800 million/year).	Future lending levels and country coverage subject to IDA 15 country allocations.
Increase Energy Services to Public Facilities (e.g., schools and medical clinics) *Program will focus on improving service delivery to health and education facilities to meet the goals of the MDGs.*	FY08: TTL Guidance note prepared.	FY08: Electrification of public facilities will begin to be mainstreamed into Bank SILs.	Low awareness and capacity in Government ministries and implementing agencies to design and implement cross-sectoral programs.
Accelerate the take-up of modern lighting services in mainly rural households and enterprises. *The target of provision of access to modern lighting is 250 million people by 2030.* *"Lighting Africa" program will accelerate the benefits associated with lighting (education, health and productivity).*	FY07: Three-year "Lighting Africa" Program will be launched as a joint World Bank and IFC initiative, with ESMAP and other donor support.	FY07: Lending components being designed in potentially two investment projects. FY07/08: IFC-support for private sector delivery of low-cost off-grid light products in Kenya and Ghana. FY08-09: Scale up engagement	Multi-stakeholder engagement needed: added complexity in implementation may cause delays. Availability of IDA 15 funding may limit scaling up.
Access to clean cooking and heating fuels.	FY08: Provide policy note for Bank staff and support for national and regional initiatives for	FY07: Eight projects under preparation with forestry	Knowledge sharing to guide policy and decision making needs to be improved to

Table A2. Increasing Energy Access in SSA

Goal: Increase Access to Electricity in Sub-Saharan Africa from about 25% to 35% by 2015 and 47% by 2030 **Results: At least 30 countries increase generation capacity by > 20% and utilities in 20 countries reduce losses by 10% or better**			
Impact	***Strategy, Knowledge, and Policy Deliverable***	***Project, Investments, and Lending Deliverables***	***Comments***
Develop sustainable woodfuel supplies, complemented by measures to improve the efficiency and safety of biomass use. *Reduce indoor air pollution and its health impacts especially on women and children who are disproportionately affected.* *Increase LPG and kerosene use by households with positive impacts on health and productivity.*	sustainable land management, including forestry. FY08: Investigate potential for bio-energy in Ethiopia and Mozambique (AAA activity) FY07 and ongoing: The Bank will advise governments on fuel pricing to remove barriers to prudent LPG and kerosene use by households.	components, five of which are proposed for GEF. FY08: Three projects in pipeline, two funded by IDA and one for carbon offsets.	reduce institutional and policy barriers for sustainable land and forest management, as well as capital to invest in land management improvements. Biofuel production might require large subsidies because of the economics involved.

Table A3-1. Transition to a Low Carbon Economy

Goal: Support Countries to Move to a Low Carbon Energy Path Results: Improvements in Energy Efficiency, Reduce Local & Regional Pollution and Reduced GHG Emissions			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments and Lending Deliverables***	***Comments***
Energy Efficiency *Bank committed to increase its lending for energy efficiency by 20%/ year, reducing the need for additional power generation and thus reducing the financing gap.*	FY08: Finalize Energy Efficiency (EE) Action Plan FY09: Continue working with IEA to (a) prepare an "Energy Efficiency Indicator" program – report due by end 2008; and (b) identify specific sectoral and equipment opportunities for EE.	FY07 and ongoing: EE programs – e.g. Africa lighting program. Detailed project list in Appendix 2.	Implementation capacities in some countries to be strengthened.
Renewable Energy *Bank committed to increase its lending for renewable energy by 20%/ year, displacing fossil fuel production and reducing GHG emissions* *Activities require removal of policy and market distortions, increased capacity in planning and implementation, increased access to technology, and access to long term financing.*	FY 07/08: Carbon Finance for Bagasse Cogeneration in Brazil FY07-08: WBI to prepare handbooks & toolkits to support operational implementation of Renewable Energy projects in the Regions FY08-09: IFC Sri Lanka Distributed Generation Project will include new contracting/financing models for small scale power generation FY07 and ongoing: ESMAP support to strategic planning, policy support, and pre-investment studies	Lending/investments for RE increases from $1 billion (FY03-05) to nearly $2 billion (FY06-08). Detailed project list in Appendix 2.	Opportunities to promote renewable energy technologies and support investments are inhibited due to the limited availability of GEF and regulatory uncertainties on the future of carbon trading.
Decreasing carbon emissions from thermal power plants	Continued TA & dissemination of knowledge and research to increase efficiency of existing power plants (i.e. rehabilitation) and facilitate move to commercially available high efficiency power plants.		Technology transfer of advanced coal technologies and carbon capture and storage dependent on protection of propriety rights for advanced technologies.
Global Gas Flaring Reduction program		Mobilizing private capital investments of US$1.7 billion in gas flaring reduction projects that offset some 6 MtCO2 emissions (Indonesia, Russia, Nigeria and Ecuador).	
Accelerating Hydropower Projects	Hydropower development strategy to include rehabilitation of existing plants, small and run-of-river plants and multipurpose hydropower plants with reservoirs. Supporting feasibility studies for technically, economically and environmentally satisfactory projects (e.g. small hydro in China and Vietnam)	New run-of-the-river (RoR) hydropower, new dam hydropower, and rehabilitation of hydropower projects: Some examples: • Bujagali (Uganda) • Rusumo Falls (Rwanda) • Rampoor (India)	Environmental, social and riparian rights issues may delay project preparation and implementation.

Table A3-1. Transition to a Low Carbon Economy

Goal: Support Countries to Move to a Low Carbon Energy Path Results: Improvements in Energy Efficiency, Reduce Local & Regional Pollution and Reduced GHG Emissions			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments and Lending Deliverables***	***Comments***
Reducing carbon emissions in transport projects	FY07: Trade Policies for Liquid Biofuels FY07: Bio-diesel in Brazil FY08: Guidance note on decarbonizing the transport sector FY08: Technical report on methodologies and data to assist with policy making and project design FY08: Policy paper on replicable best practices. FY08: Investigate potential for bioenergy in Ethiopia and Mozambique	FY08 pipeline of projects: • India Sustainable Urban Transport • China Urban Transport • LAC Regional Transport	

Table A3-2. Transition to a Low Carbon Economy

Goal:Prepare Low Carbon Country Case Studies in G+5 countries which identify a development path that respects poverty alleviation and economic growth targets with lower carbon emissions			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments and Lending Deliverables***	***Comments***
India: *Maintain India's relatively low carbon intensity in context of high economic growth* *Goal of reducing electricity transmission and distribution losses from >40% to 20%*	FY08: India Low Carbon Country Case Study FY08: Identify opportunities for large hydropower generation in NE India FY08: Power trade facilitation with Nepal FY08: Assess opportunities to improve investments in renewable energy	Projected programmatic lending to states (US$1-2 billion over 2008-13 period) Possible energy lending program of up to $4 billion for FY07-FY09 being discussed with GoI. Details of individual projects in Appendix 2	
China: *China's economic growth, coupled with relatively high dependence on coal for power supply will make it the world's largest emitter of GHGs before 2010.* *Study will focus on ways to mitigate this trend.*	FY07: China Low Carbon Country Case Studies: Assessment of short-term low-carbon policies and measures FY08: Refinement of low-carbon strategy FY08: AAA Reform of district heating sector FY08: AAA Economic dispatch of power plants – potential reduction in coal consumption estimated to be over 150 mt/ year FY08: National and provincial level guidelines and regulations for coal mine methane collection and utilization	FY07-09: $500 million (IBRD) FY07-08: $34 million (GEF or GEF/IBRD grants/lending) FY07-08: Avg. 4 projects/year (Carbon finance) Details of individual projects in Appendix 2	Scaling up of low carbon solutions will depend on availability of carbon financing and incremental grants.
Brazil *Bioenergy and forestry programs may be important component of the potential to reduce global carbon concentrations.*	FY07 and ongoing: Activities include energy efficiency, cogeneration, renewable energy, rehabilitating inefficient thermal and hydropower plants, and building new hydropower plants to be included within the Low Carbon Country Case Study. FY07/08: Work in Amazon focuses on reducing pressures on standing forests, sustainable management of forests, and avoided deforestation.	FY07-09: IBRD program to be discussed with GoB. Details of individual projects in Appendix 2.	
Mexico *Significant potential for energy efficiency as well as large wind and solar resources can contribute to Mexico's development and lower global GHG emissions.*	FY07/08: Low Carbon Country Case Study. FY08: AAA identifying efficiency improvements and evaluation of policy and regulatory support for EE FY07: AAA support to promote commercial bank financing of EE	FY07-09: IBRD program to be discussed with GoM. Details of individual projects in Appendix 2.	

Table A3-2. Transition to a Low Carbon Economy

Goal:Prepare Low Carbon Country Case Studies in G+5 countries which identify a development path that respects poverty alleviation and economic growth targets with lower carbon emissions			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments and Lending Deliverables***	***Comments***
South Africa *Significant potential for reducing the growth of GHG emissions, in light of the power expansion plan and heavy reliance on coal*	AAA (FY08) South Africa Low Carbon Country Case Study	Potential GEF and carbon projects. Details of individual projects in Appendix 2.	Preliminary engagement towards an AAA is being explored. Scaling up of low carbon solutions will depend on availability of incremental grants.

Table A3-3. Transition to a Low Carbon Economy

Develop New Methodologies and Mechanisms for Carbon Financing and Innovative Mechanisms to Blend Existing Financing		
Impact	***Strategy, Knowledge and Policy Deliverables***	***Comments***
Ensure continuity of the carbon market prior to completion of post-2012 negotiations	FY08: Board paper to propose development of post-2012 carbon continuity fund	Need to manage perception of "getting ahead" of post-2012 negotiations
Green investment schemes will expand the opportunities to cost-effectively reduce GHG emissions	FY07/08: Develop methodology for Green Investment Schemes FY08-09: Latvia and Ukraine Green Investment options studies expected to become operational	
Demonstrate that carbon credits from deforestation are verifiable	FY07/08: Develop methodology for avoided deforestation; New initiatives to develop capacity, pilot policy reforms and invest to reduce emissions from deforestation and forest degradation.	Need to manage perception of "getting ahead" of post-2012 negotiations
Demonstrate that energy efficiency projects can qualify for carbon financing	FY07/08: Issues paper to develop methodology for energy efficiency.	
Reduce costs of carbon offsets through auction mechanisms	FY07: Develop auction platform and related legal documentation – first auction conducted by end of FY07.	
Efficient and innovative uses of existing financing mechanisms	FY08: Design of Country Specific Clean Energy Financing Programs which combine IBRD, IFC, MIGA, GEF and carbon financing.	
Efficient and innovative uses of existing financing mechanisms	FY07/08: Design innovative approaches to support clean energy investments via blending of existing financial instruments.	
Design new and innovative mechanisms that can provide the scale of investments needed to transition to a low carbon economy	FY08: Further evaluation and design of a Clean Energy financing mechanisms in consultation with governments, GEF and the private sector	

Table A4. Adaptation to Climate Variability and Change

Goal: Pilot Instruments on a Country-by-Country Basis to Scale Up Adaptation Activities **Results: Set the Stage for Mainstreaming Adaptation into the Development Process**			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments/Lending Deliverables***	***Comments***
Climate Risk Assessment *Assessment tools will deliver robust and easy to use tools for assessing development projects and programs.*	Approximately 25 TA or sector analytical work are planned or underway, including: FY07-09: Complete the prototype screening tool for: • Agriculture-water sector for South Asia and Africa (FY07) • All sectors for Africa (FY08) • All sectors for all regions (FY09) About $5 million/year grant funding for screening to be integrated in upstream analytical work such as CEAs FY07: Develop a systematic web/CD database for Africa including: • development relevant experience on adaptation to climate risks • core climate data and associated risks FY08: Complete web/CD database for all regions		All activities, including peer-review, will be collaborative with other MFIs, UN agencies, bi-lateral donors and NGOs. Work will be closely related to Global Facility for Disaster Risk Reduction (GFDRR) Funding for scaling up adaptation work will be a challenge.
Good Practice Guidance and Capacity *Guidance will be focused on selected countries and few priority sectors: i.e., water and agriculture, major infrastructure, and large coastal cities with a goal to identify specific achievable prioritized actions and opportunities*	FY07/08: Pilot projects to mainstream adaptation into Bank operations in Kenya, Tanzania, Burkina Faso FY08: Additional three pilots in other regions FY07/08: Three cross-sectoral country-wide risk assessments from climate variability/ change FY08: Six cross sectoral assessments FY08: Incorporate adaptation in 5 GFDRR country assessments FY09: 10 adaptation assessments FY08: Good practice guidance in assessing and adapting to climate risk : (i) water-agriculture-rural infrastructure; (ii) low-lying coastal cities; (iii) integration of adaptation into disaster reduction programs; and (iv) large infrastructure including insurance models	Examples include: LAC: Over 15 projects for coastal management, glacier retreat, water management, agriculture adaptation MNA: Agrobiodiversity and adaptation AFR and SAR: sustainable land management and drought adaptation ECA: Hydromet and early warning systems EAP: Large-scale irrigation in China and small island risk management in the Pacific.	4 or 5 cities will be studied in detail to identify and prioritize adaptation measures.

Table A4. Adaptation to Climate Variability and Change

Goal: Pilot Instruments on a Country-by-Country Basis to Scale Up Adaptation Activities **Results: Set the Stage for Mainstreaming Adaptation into the Development Process**			
Impact	***Strategy, Knowledge and Policy Deliverables***	***Project Investments/Lending Deliverables***	***Comments***
Financing Climate Risk Assessment and Adaptation *Approximately 40 projects (loans and grants) in 30 countries are underway or planned,*	FY08: Economics of Climate Change analysis in LAC FY08: Joint IFC IMF report to assess financial implications of climate proofing development FY08: Assess options for increasing the flow and reliability of funds for adaptation	Grant funding (including GEF) for adaptation projects expected to increase from $5million (FY06/07) to $60million (FY08/09) Expected to leverage: • $500 million in additional IBRD, IDA, and other funding • $50 million/ year investments in related capacity development and institutional reform (FY09-12) 10% to 20% increase in lending for irrigation, sustainable land management, flood control, coastal infrastructure (FY10)	GEF and other funds are currently inadequate to meet demand. Most Bank support will be met through IBRD and IDA operations whereby project designs and budgets are adapted to new climatic conditions
Adaptation Awareness, Capacity and Results Dissemination Identify and deliver capacity and information needs directly into projects and facilitate the maintenance of capacity within countries	FY08: Customized awareness raising, capacity assessment and building tools in each Region FY08: Report on methods for delivery of focused capacity building at project and program level FY07-08: Develop information and trainer networks to maintain capacity. Example of African network with at least two core support institutions in Africa. 4 countries with active capacity maintenance programs.		WBISD will deliver these tasks in Regions in close cooperation with other agencies

Table A5. Outreach and Communications
Synopsis of 2007 Actions

- 3rd Senior Level meeting of the Infrastructure Consortium for Africa (ICA) – Berlin on January 17 & 18, endorsed sector wide approach and harmonization of donor support for energy access scale-up
- Renewable Energy- Launch of book with multi-stakeholder panel discussion- January 23,2007
- Clean Energy Investment Framework booklet directed to decision makers — February 15th produced and ready for dissemination.
- Provision of content to BBC World –Spring Series on Climate Change
- Washington Legislators Forum on Climate Change and Climate Security with address by WB President Paul Wolfowitz and VP Sustainable Development Kathy Sierra, organized by Globe and the COM+ Alliance with Bank support. 14-15 February.
- Multimedia package on clean energy posted in Bank's main website (external and internal) weeks of February 12 and 19.
- Towards a Europe-Africa Energy Partnership donors meeting - Berlin on March 6-7 organized by German Federal Ministry for Economic Cooperation and Development (BMZ) and the European Commission
- Private Sector Forum- Building Public-Private Partnerships around the Clean Energy Investment Framework, organized by WB, EBRD, World Economic Forum (WEF), World Business Council on Sustainable Development , with the participation of private sector leaders, heads of MDBs and governments from Plus 5 nations, London March 13-14.
- Regional forums will be organized following the global forum in emerging economies - May 2007-April 2008
- TICADIV conference on Energy and Environment - Nairobi on March 22 & 23 organized by Japan, UN and the Bank
- Energy Security and Access Ministerial conference organized by the Forum of Energy Ministers for Africa - Maputo on March 28-30, co-sponsored by the Bank, BMZ and DANIDA.
- Transport Forum- World Bank- Multi-stakeholder debate on Bio-fuels- March 26
- Carbon Expo 2007 - Keynote address on the Clean Energy Investment Framework, plus multimedia actions and preparation actions - April 15-May 5
- UNCSD 2007 – Keynote presentation at the high level Ministerial Session - May 8-11; plus media engagements and side events
- Multi-stakeholder conference on low carbon energy options – Stockholm Sweden, May (tbd), to be organized by COM+, Globe and SIDA.
- Berlin Legislators Forum, bringing together more than 100 legislators, private sector representatives, CSOs and opinion leaders - expected to send a message to the G-8 leaders on clean energy who are meeting the week after the Forum - June 3-4
- Multi-stakeholder event on Clean Energy and Development with World Economic Forum –Annual Meetings IMF-WB- October 19
- UNFCCC- Conference of the Parties to the UNFCCC/Meeting of the Parties to the Kyoto Protocol ('COP/MOP') - November 2007 – Bali

ANNEX 2. ENERGY ACCESS IN SUB-SAHARAN AFRICA

HOW REALISTIC IS THE GOAL OF RAISING ELECTRICITY ACCESS IN SSA TO 35% BY 2015?

1. Electricity access increased in SSA from 19% of the population to 24% during the decade '95-2005 (i.e. 13 million connections were made and 66 million people gained access). The Action Plan calls for increasing access to 35% of the region's population by 2015 implying that 29 million new connections will be made by then. The target reflects country goals. For example Ghana has a target of 60% by 2012 (from 50% currently); Zambia as a target of 30% by 2011 (from 20% currently) ; Ethiopia has a target to electrify virtually all towns and villages to the grid over 10 years; Nigeria has a target of 70% by 2015 (from 40% currently); Tanzania has a target of 25% by 2015 (from 10% currently); Uganda has a goal to provide access to 10% of rural households by 2010 (from 1% in 2000).

2. Meeting these national access goals in these five countries would represent approximately 17 million new connections by 2015. Clearly these are ambitious goals and there are a number of reasons why they are unlikely to be met unless investment flows (including concessional funding) increases considerably (and other policy and institutional reforms are made).

3. With good reason, many of the countries in SSA are now (and for the next 4/5 years) prioritizing expansion of generation capacity to address current shortfalls. For example a large IPP program in Nigeria together with a public investment program is likely to achieve an increase in available capacity of about 7GW (from approximately 3 GW currently) by 2010. Nigeria has budgeted large resources for network expansion (in the region of $1 billion from the federal and states budgets in the current budget cycle). Given the timetable of the generation capacity expansion program and the current level of resources for network expansion, reaching 70% access by 2015 may not be feasible. If approximately 6 million new connections are made in Nigeria by 2015 the access rate will be raised from 40% to 50% (raising it to 70% would require 12 million new connections). Similarly in Uganda the focus of the current investment program is also on generation capacity additions with just 180 thousand new grid connections forecast by 2016 (from 304 thousand currently). Therefore the projected national access rate in Uganda is likely to be less than 10% by 2015 under the current investment program.

4. Based on analysis of these and other country investment program it may be projected that the region-wide access rate in 2015 will be in the range of 30 to 35%.

5. The Action Plan will accelerate country efforts to increase access through sequential investment programs for generation capacity additions, transmission grid construction and network expansion. IDA and IFC projects under implementation and planned in the next few years will support generation expansion and putting in place the policy reforms and institutional arrangements that are prerequisites for later aggressive network roll-out. Aggressive network expansion is feasible once generation capacity increases to the point where current suppressed demand from existing connected customers is fully served. Therefore, in addition to supporting generation capacity additions and grid and off-grid expansion, IDA projects in FY07-08 support policy and institutional development that will enable grid and off grid-programs to be sustainably scaled-up once current generation and transmission investment programs improve the power

supply situation. In parallel, in countries that already have enabling policy and institutional environment the Action Plan will help countries prepare SWAPs and sector syndications to leverage and mobilize private and concessional finance in support of government's own investment. SWAPs will also bolster country capacity to implement large roll-out programs. The World Bank is working in Senegal and Zambia to prepare SWAPs in the next two years and is advocating that other IFIs and donors work in at least two other countries. Successful implementation of this first cohort of SWAPs would then over the next 5 years lead to adoption of the approach in other countries.

6. In conclusion, in order to achieve 35% access, by 2015, increased concessional funding and harmonization of donor effort through sector wide approaches will be necessary to mobilize private and public resources for sustainable scale-up programs.

ANNEX 3. LOW CARBON ACTIVITIES IN BRAZIL, CHINA, INDIA, MEXICO AND SOUTH AFRICA

Table A3-1. Brazil

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Rural energy access	AAA and project preparation activities (GEF) to provide electricity and other energy services to remote rural consumers in Amazonia through renewable energy technologies.
Hydro power development	AAA to support the analysis of policy and regulatory barriers to hydro development.
Demand-side Energy efficiency	• AAA to identify efficiency improvements and evaluate policy and regulatory support for energy efficiency. • AAA support to BNDES for an energy efficiency guarantee facility to support ESCOs. • Discussions with private sector on rehabilitation of power plants to improve efficiency.
Supply-side Efficiency improvements	• Discussions are underway for modernization of old hydro power plants (5,000 to 10,000MW) owned and operated by state-owned utilities with a combination of lending and carbon finance • Discussions are underway to promote greenhouse gas reductions of 2 to 5 million TCO2e/year in the oil and gas sector facilitated by carbon finance.
Scaling-up renewable energy development	• Preparation of project to support the increase in bagasse cogeneration and other renewable energy through establishing an auction process for carbon revenues. [FY08, $10mn] • Discussions are underway to strengthen the PROINFA (Programa de Incentivo a Fontes Alternativas) – through which an estimated 3,300MW of renewable energy capacity will be installed by 2008 – by providing carbon finance to the eligible projects. • Through ESMAP support, the Bank is evaluating the economics of biodiesel production in Brazil from different feedstocks, regions and production regimes.
Urban transport development strategy	Around $8.5 million for Brazil from the GEF Regional Sustainable Transport and Air Quality Project will support pilot investments in Belo Horizonte, Curitiba, Porto Alegre and Salvador to promote more efficient transport systems in cities and provide real-world experiences for the country and region. Specific areas for support are: improving efficiency of freight transport, promoting public and non-motorized transport, implement coordinated land-use and transport policies, and transport demand management. IBRD projects for urban transport are under preparation in several of the cities.
Biodiesel use in Brazil	Brazil is in the process of developing biodiesel as a substitute to petroleum diesel to support domestic agricultural producers, especially small farmers, and has established a national target of 2% biodiesel in the total diesel mix by 2008 and 5% by 2012. The Bank is assisting in the assessment of biodiesel development in Brazil looking at different feedstocks, different geographical regions, and different production scales. The assessment will include an analysis of the financial and economic aspects at the farm and processing plant level, as well as the fiscal, distributive, and environmental impacts of the biodiesel program. Working with Brazilian agencies and researchers, the project is expected to provide useful information to policymakers in Brazil and other countries who are interested in developing biodiesel. A draft report is expected in April 2007 with the final report

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
	and workshop in June 2007.
Reducing methane emissions from landfills	Emissions from landfills are a significant source of greenhouse gas emissions in Brazil. Developing local capacity (particularly of a financial intermediary) to aggregate and scale-up carbon finance for the waste management sector is agreed as the most efficient implementation mechanism. The Bank is working with Caixa Econômica Federal ("Caixa") to provide financial (US$50 million loan) and technical support to finance waste management projects and to carbon market.
Bagasse Cogeneration	Bagasse cogeneration projects reduce CO2 emissions by substituting for electricity produced by thermal plants. While around 600 MW of bioelectricity from bagasse cogeneration has been installed in the past several years, and is in general competitive with other sources of electricity (hydro, coal, natural gas), an additional 2,000 MW of capacity could be installed in the immediate future with the incentive of carbon revenues. In cooperation with the sugar producers association (UNICA) and COGEN–SP, the World Bank is preparing a project to stimulate the production of bagasse cogeneration and other renewables through a unique carbon auction program.
Reducing greenhouse gas emissions from land-use change	• Emissions from deforestation represent 75% of the total emissions from Brazil, making land-use change as the single most important issue from a climate change perspective. The World Bank is exploring the scope for a new program on reduced emissions from deforestation in partnership with other stakeholders The program may develop a performance based pilot facility to create, implement and evaluate a voluntary market-oriented incentive program to finance and foster activities that would reduce deforestation. • Alto Solimoes Basic Services and Sustainable Development project ($25 mn) will fund sustainable forestry management practices and avoided deforestation projects being designed at national and state levels
Low Carbon Brazil Case Study	AAA to assist GoB to articulate a strategy for further lowering the carbon intensity of its development path that is beneficial for national growth objectives at the macro and sectoral levels, by identifying synergies and addressing potential trade-offs through leveraging external finance.

Table A3-2. China

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Thermal Power Plant Efficiency Improvement	GEF Project being prepared to support closure of small, inefficient plants; identify and pilot key thermal rehabilitation measures; and improving system operating practices.[FY08, $19.7 mn]
District heating sector rehabilitation and restructuring (Saving potential of 250 Mtce by 2010)	AAA to support sector restructuring and regulatory framework for sector. IBRD Project to rehabilitate municipal DH systems. [FY08, $ 200mn]
Coal mine methane collection and utilization	AAA to develop national and provincial level guidelines and regulations. IBRD project to pilot the collection and utilization in pilot provinces [Shanxi – FY09, $100 mn]
Improving industrial energy efficiency	Building efficiency improvement project (GEF -$ 18 mn. Under implementation). IBRD+GEF Project to build capacity for commercial bank lending for energy efficiency [FY08, $ 200 mn]
Scaling-up renewable energy development (Target to implement 30GW of wind and 30GW of biomass generation by 2020]	Two phases of IBRD+GEF China Renewable Energy Scale-Up Program (CRESP) under implementation – to develop renewable energy implementation guidelines and policies, as well as building local capacity. IBRD Project to implement efficient and cleaner Biomass CHP systems [FY09, $ 60 mn]
Urban transport development strategy	US$21 million GEF Project under preparation to (i) support national urban transport strategy and associated capacity building; (ii) finance a series of pilot projects that demonstrate transport developments that offer an alternative to private motorized vehicles. It is expected that some of the pilot cities will turn to IBRD financing for full-scale investments.
Participation in the market for emission reductions under the Kyoto Protocol's Clean Development Mechanism (CDM)	From FY-05 to present, Bank Carbon Funds have signed ten Emission Reduction Purchase Agreements in China (total $1.2 billion), and Bank has supported CDM Studies and policy framework development. Recent expansion has been supported by promotional workshops and other activities to extend CDM to priority sectors targeting 11th Plan energy efficiency and new renewables outcomes, such as iron & steel industry, and to livestock/poultry bio-gas. IFC is scheduled to present its first CDM project in China utilizing its Carbon Delivery Guarantee for an HFC project to the Board in early March 2007 for up to $37 million.

Table A3-3. India

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Low Carbon Growth Study	AAA to support the Government of India (GoI) in (i) articulating a cost-effective strategy for further lowering the carbon intensity of the economy in a manner beneficial for national growth objectives; (ii) identifying opportunities for and facilitating leveraging financial resources as well as explore the possible need for new financing instruments; and (iii) raising national awareness and facilitating informed consensus on India's efforts to address global climate change.
Energy Efficiency	• Ongoing Powergrid IV project (IBRD $400million) in a series of past and proposed future operations supporting development of a National Transmission grid to increase efficiency of power flows in the country. • Along with IBRD financing, carbon finance support is being prepared by the Bank for developing a high capacity transmission corridor for transporting hydro power developed in the North-east to demand centers across the country. • The Chiller EE project to assist India in achieving a market transformation towards energy efficient centrifugal chillers. This project will accelerate the replacement of up to 500 chiller units, representing a total capacity in excess of 200,000 tons of refrigeration (TR) in both private and public companies and institutions. Carbon finance support for this project is being prepared by the Bank. • Small & Medium Enterprises steel units in the secondary steel sector are highly energy intensive and polluting. The SME Steel Cluster project is an initiative to reduce Specific Energy Consumption (SEC) per ton of forged steel production through Energy Efficiency improvement-based technological interventions in the Small and Medium Enterprises steel forging cluster units operating in Punjab. • EE Improvement in Water and Sewerage Services of Delhi Jal Board with objective to reduce the present level of energy consumption associated with the municipal water supply and sewerage services of Delhi. • Improving the Efficiency of Agricultural Pumpsets in Andhra Pradesh, Tamil Nadu, and Madhya Pradesh. This carbon finance project is associated with a Bank lending project which plans to improve the efficiency of 50,000 water pumpsets in each of the three states. • The Punjab high voltage distribution system (HVDS) plans to convert 400-V distribution systems to 11– kV HVDS to improve the efficiency of existing distribution systems. The project is supported by carbon finance. • The Bank is developing the Programmatic Framework Fund for Cleaner Energy and Lower Carbon Development Project as a delivery mechanism that will capture a significant part of India allocation under the GEF's climate change window. The project will also bring together co-financing from Carbon Finance and bilateral sources, in addition to significant commercial co-financing, into an umbrella-type operation that will support energy efficiency initiatives in several sectors, including the building sector (private and public) and the commercial and industrial sector working through Indian financial institutions.
Rehabilitation and/or replacement of thermal power plants	A US$ 190 million (US$118 million IBRD and US$45 million GEF) project under preparation for rehabilitation of old, inefficient coal plants, targeting about 800 MW of rehabilitation (out of a possible 25,000 MW) for rehabilitation on a pilot basis. In addition dialogue underway for IBRD financing of 1000 MW of replacement. Together these two projects are intended to showcase effective reduction in emissions, performance improvement, institutional development and reform of selected state generation companies. Carbon finance support for this project is being prepared by the Bank.

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Large hydropower	• Hydropower development, targeting about 1,800 MW (out of the 16,000 MW planned under the 11th Plan) to showcase good technical and environmental practices, and strengthen the foundation for scaling up development of 100,000-150,000 MW of India's hydropower potential by 2030. GoI has requested IBRD funding for 3 run-of-river projects and additional projects are under discussion. Carbon finance support for these projects is being prepared by the Bank. • A PPIAF supported study on optimization of river basin development.
Hydropower rehabilitation	Proposed carbon finance support for renovation and modernization of 2866MW project operated by the Bhakra Beas Management Board with expected uprate of 95MW.
Renewable energy	• The ongoing Second Renewable Energy Development Project (IBRD $54 million; IDA $50 million; GEF $5 million) supports the Indian Renewable Energy Development Agency in development of small hydro projects. • An ESMAP funded Investment Climate Assessment Study is being initiated to identify prevailing regulatory, policy and other blockages which are preventing India from achieving its target of having 10% of power generation based on renewable energy. Study will develop solutions for a few states.
Participation in the market for emission reductions under the Kyoto Protocol's Clean Development Mechanism (CDM)	From FY-05 to present, Bank Carbon Funds (including IFC) have signed two Emission Reduction Purchase Agreements in India (total $7.5-million), and Bank has supported CDM Studies and policy framework development
Transport	• Proposed US$10 million GEF project to provide technical assistance for sustainable urban transport and to finance urban transport pilots. • Emission Reduction from a fleet of 9,000 buses in Karnataka through a) Fuel Switch (10% replacement with Straight Vegetable Oil), b) water induction kits, c) diesel/ethanol blend (7.7% replacement with ethanol, and e) driver training / engine tuning. Carbon finance support for this project is being prepared by the Bank.

Table A3-4.Mexico

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Rural energy access	Bank is preparing a rural energy project with grant and loan funds to provide energy services to remote rural consumers in Mexico's southern states with renewable energy technologies. [FY07 $15m GEF, $15m IBRD]
Energy efficiency	AAA identifying efficiency improvements and evaluation of policy and regulatory support for energy efficiency. AAA support to promote commercial bank financing of energy efficiency in Mexico. Discussions with private sector on rehabilitation of power plants, and other energy efficiency related to carbon finance.
Scaling-up renewable energy development	Implementation of large-scale wind project underway in Oaxaca as national model for grid-connected renewable energy development. [GEF $25m] The solar thermal project would be one of the first large-scale project of its kind in the world financed by the GEF and the World Bank. [GEF $49.35m]
Urban transport development strategy	Around $8 million for Mexico from the GEF Regional Sustainable Transport and Air Quality Project would support pilot investments in Monterrey, Leon, Ciudad de Juarez, and Puebla to promote more efficient transport systems in cities and provide real-world experiences for the country and region. IBRD projects for urban transport are under preparation in several of the cities.
Participation in the market for emission reductions under the Kyoto Protocol's Clean Development Mechanism (CDM)	From FY-05 to present, Bank Carbon Funds (including IFC) have signed 3 Emission Reduction Purchase Agreements in Mexico (total $53 million). The Bank carbon funds have purchased emission reduction credits for landfill gas, wind power development, and the first transport related emission reduction purchase. New projects under discussion for industrial energy efficiency and new renewables.

Table A3-5. South Africa

Low Carbon Policy/Measure	*World Bank Group Support Under Preparation/Implementation*
Rural Energy Market Transformation Project	GEF financed [US$ 6 million] project: scheduled for Board in FY07, subject to outstanding issues relating to procurement being resolved.
Energy Efficiency Improvement Project	GEF financed project [US$7 million]: processing subject to availability of funds and GEF approval.

ANNEX 4. CARBON FINANCE ACTIVITIES

1. The Bank's carbon finance program managed by ENVCF intrinsically supports the objectives of the second pillar of the Investment Framework by providing incentives for transitioning to a low-carbon economy in World Bank client countries through the global carbon market. Carbon finance in the Bank began with the establishment the Prototype Carbon Fund in 1999,[1] and has since grown to nine funds and facilities under management today. ENVCF's business activities over the coming 18 months primarily focus on the following objectives:

- ***Maximize use of existing Bank-managed carbon funds to support investments that generate emission reductions.*** As of December 31, 2006, the total amount of funds under ENVCF management, net of project and administrative costs, was $1.86 billion, of which $1.41 billion has been committed in ERPA[2]s for 190 million tCO_2e,[3] with an additional 66 million tCO_2e expected from the current pipeline. Payments for emission reductions are made over the life of the ERPAs, or as the emission reductions are generated by mitigation projects. It is expected that approximately 15 additional ERPAs will be signed during the remaining of FY07, amounting to approximately 10 million tCO_2e and US$90 million. A significant number of smaller community-development-oriented and forestry projects are expected to be included among those ERPAs. Yet to be committed funds (beyond FY07) total $358 million. The majority of these funds are expected to be committed during FY08 and the first half of FY09. Assuming a conservative average ERPA size of approximately 800,000 tCO_2e and contract value of $7.2 million, this would represent approximately 50 ERPAs. Information on funds and portfolio development is included in Table 1.

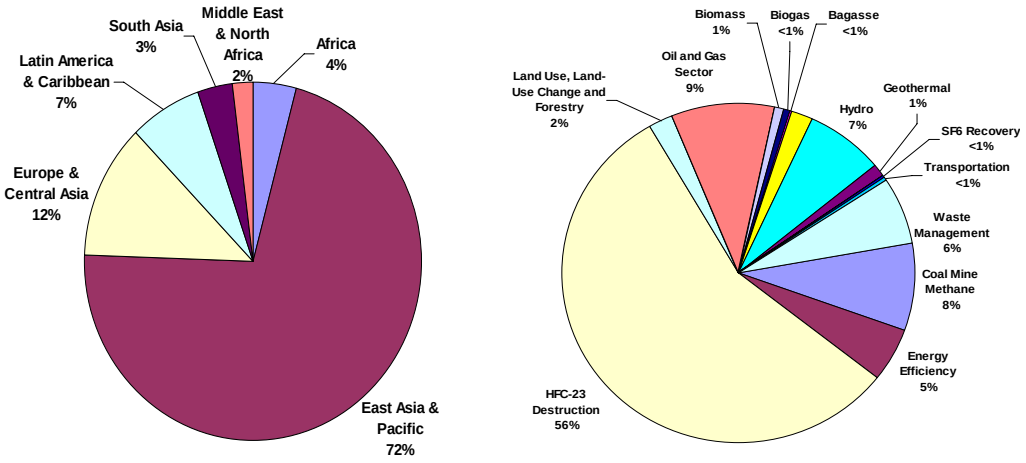
- The distribution of carbon finance transactions in ENVCF's portfolio by sector/technology and region is shown below. ENVCF is moving towards particular emphasis on identifying, in close consultation with client countries and country teams, *programs* of carbon finance transactions (as opposed to project-by-project transactions) in specific sectors (power, rural energy, oil and gas production, transport, solid waste management, land management, reforestation, etc.) to increase the impact of carbon finance, integrate it into development plans and reduce transaction costs of these transactions.

[1] Or even earlier - with a trust fund for "Activities Implemented Jointly" under the United Nations Framework Convention for Climate Change.

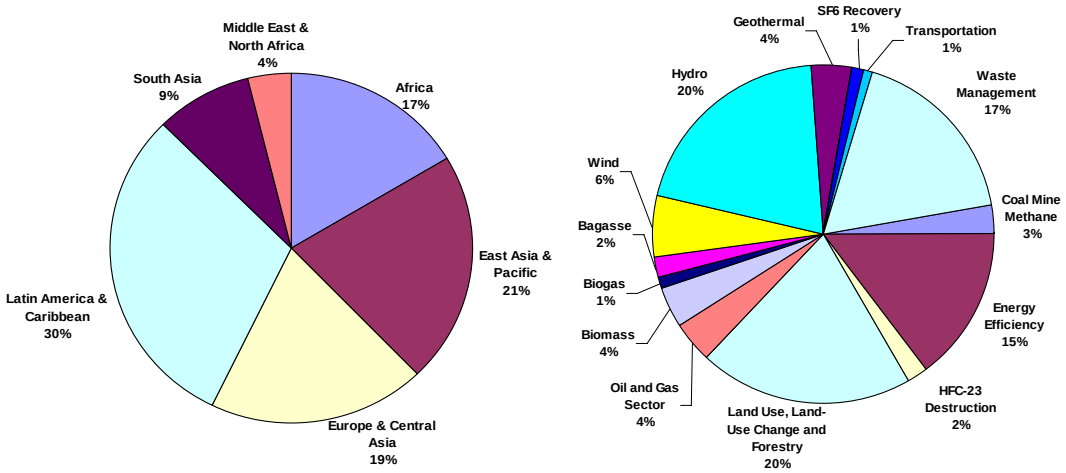
[2] Emission Reduction Purchase Agreement

[3] Tonnes of carbon dioxide equivalents

2. Figure 1: Current portfolio and pipeline of projects in World Bank Carbon Funds by region and technology, respectively, based on carbon asset value of projects with Carbon Finance Document (CFD) approved (total approx. $1.798 billion).



3. Current portfolio and pipeline of projects in World Bank Carbon Funds by region and technology, respectively, based on number of projects with approved Carbon Finance Document (CFD) (total 103 projects).



4. A new fund, the jointly administered World Bank /European Investment Bank Carbon Fund for Europe of Euro 50 million is being established. Plans are currently underway to open new tranches of existing funds (e.g. BioCF, Umbrella Carbon Facility), including a dedicated tranches to reduce emissions from deforestation as well as the new facility described below.

- Continue to expand the carbon market by developing new methodologies and testing new approaches to structuring and financing carbon asset creation.Examples include (a) the joint work carried out by ENVCF and the ECA region to develop a legal, regulatory, and institutional framework for international greenhouse gas emissions trading, with a focus on green investment schemes which will channel the revenues from emissions trading to further emission reducing activities; (b) the spearheading

work underway by ENVCF and ARD to develop market-based mechanisms to provide incentives to avoid deforestation; (c) the joint ENVCF-ESMAP work to identify mechanisms through which programmatic CDM can promote the implementation of energy efficiency standards and labeling programs in developing countries; (d) assistance to client countries in developing mechanisms to improve carbon price discovery through the use of auctions of emission reduction credits (e.g. Brazil cogeneration).

5. Going forward, ENVCF also seeks to enhance mechanisms that complement GEF and regular bank lending activities, and further increase carbon finance opportunities.

- ***Ensure continuity in the carbon market through establishing a new carbon finance facility.*** Carbon finance as one of the incentives to facilitate transitioning to a low-carbon economy faces two major challenges. First, in the short term, the uncertainties related to an international agreement on future targets for GHG emission reductions beyond the first commitment period of the Kyoto Protocol could undermine the global carbon market, despite the likely continuation of the European emissions trading scheme and the emergence of new, albeit smaller markets. Second, in the medium term, there is a need to develop mechanisms to significantly *scale up* the impact of carbon finance and promote low carbon growth. ENVCF, in consultation with governments, the private sector and other stakeholders, is currently in the process of designing a new carbon facility that would purchase emission reductions beyond the current regulatory period of the Kyoto Protocol, with a particular emphasis on programmatic and sector-based approaches that would deliver significantly larger volumes of carbon finance. The proposed facility would be open to asset creation in any regulatory scheme. On behalf of its participants, the facility would match buyers and sellers at an early stage, and shift from the project-by-project mode to a more systematic approach that also reflects client countries' sectoral development paths. The facility would leverage the Bank's analytical work (e.g., low carbon growth strategies in selected countries) and experience with policy dialogue to help client countries develop investment programs that incorporate measures to mitigate climate change, while providing the assurance of buyers for the emission reductions, despite uncertainties with the future regulatory regime. The Bank would, through this proposed facility, contribute towards a more balanced representation of buyers in the industrialized countries and sellers in developing countries.

ANNEX 5. POTENTIAL GLOBAL ENVIRONMENT FACILITY CONTRIBUTION TO THE IMPLEMENTATION OF THE CEIF[4]

1. The Global Environment Facility (GEF) operates as the financial mechanism of the UN Framework Convention on Climate Change. In the fifteen years of its existence, it has allocated more than $2b to projects designed to help countries fulfill their commitments to the climate change convention through preparing national communications; mitigating emissions of greenhouse gases (GHG's); and more recently, learning to adapt to the adverse impacts of climate change. This $2b of GEF funding has leveraged another $10b of financing, from both public and private sources, to projects supporting the mitigation of climate change. The objectives of the GEF are wholly consistent with those of the World Bank working under the CEIF, and a closer collaboration between the GEF and the Bank will add strategic value to both programs.

2. The GEF is committed to financing innovative projects that benefit the global environment and the livelihoods of the people in developing countries. Past GEF projects have successfully resulted in the adoption of China renewable energy law; the stimulation of the Indian wind industry; the adoption of energy efficiency standards and labeling for lighting and appliances in a number of developing countries; and the promotion of hundreds of millions of dollars of investments in energy-efficient and renewable-energy technologies. Completed GEF projects have resulted in over 500m tons of $CO_{2\ equivalent}$ being reduced from the atmosphere, and when ongoing projects are completed, more than 2 billion tons of $CO_{2\ equivalent}$ will have been mitigated over the life of the investments.

3. The GEF and the Bank have collaborated in the past, but this collaboration has not been sufficiently well integrated to enable the mainstreaming of the GEF's mandate on climate change into the Bank's operations. By integrating the GEF and the World Bank programs more completely in the future, their joint efforts would be supportive of the objectives of the CEIF while bringing much greater leverage and impact to the resources of both institutions. Given present resource availability, the potential impact of Bank-GEF collaboration will continue to be limited. For these goals to be fully accomplished in the future, more resources from both the public and private sector sources will be required, and the resources that are available will have to be used more effectively.

4. The following discussion presents some areas of expanded collaboration between the Bank and the GEF that are consistent with the CEIF's Pillar II on the Low Carbon Economy and Pillar III on Adaptation and that can be implemented immediately. This expanded collaboration between the GEF and the Bank will strengthen the overall response to the climate change challenge, maximizing the use of existing resources and presenting further opportunities through which additional resources and instruments can lead to significant additional impacts.

A. Collaboration under Pillar II: Transition to a Low Carbon Economy

5. The GEF and the Bank have identified five areas of collaboration with respect to the Transition to a Low Carbon Economy. The Bank has taken the lead in some areas and the GEF

[4] Source: GEF Secretariate

in others. These initial undertakings are necessary to lay the foundation for more ambitious future collaboration.

6. ***Policy Transformation.*** GEF operations in the climate change focal area have increasingly moved from demonstrations of climate-friendly technologies to systematically removing barriers that hamper the adoption of these technologies so that the markets for these technologies can be stimulated and transformed. Introducing policy changes and creating enabling policy environments are central to the GEF's barrier removal approach. GEF projects support creation of the legislative and regulatory frameworks as well as market-based financial mechanisms and business models so that climate-friendly technologies and practices can be widely disseminated and deployed. This upstream work supported by the GEF paves the way for the Bank to engage its clients in policy dialogues and follow-up investments. The GEF has successfully played this role in many of the Bank-implemented GEF climate change projects and will continue to do so with the resources that have been made available for GEF-4.

7. With additional resources, GEF and the World Bank could:

- undertake a more ambitious program targeting legislative and policy demonstrations and reforms in key countries and sectors;

- mobilize a larger-scale renewable energy and energy efficiency markets in smaller and less developed countries, and

- provide more comprehensive and sustainable solutions to dirty coal plants not only in G+5 countries, but also in additional countries (see below).

8. ***Clean Energy Case Studies.*** The Bank has initiated a review of the Plus Five Countries (China, India, Mexico, Brazil, and South Africa) and how they can concretely pursue a low carbon economy through their energy development plans. This work builds upon the scenario work already undertaken by IEA and will attempt to identify concrete measures to implement these scenarios. The GEF has funded national communications in all developing country Parties to the UNFCCC, and has an ongoing dialogue with all countries regarding their programming priorities. Adding GEF participation to the case studies will accomplish three things. First, the GEF will be able to contribute its knowledge, drawing upon the work of countries to prepare national communications for the UN Framework Convention on Climate Change, with a view to making the studies more concrete and ensuring that the studies contribute to future national communications and action. For each country, GEF programming in the country can provide an initial concrete step toward implementing the countries' clean energy agenda. The Plus Five countries are the larger recipient of GEF resources under the Resource Allocation Framework. Second, bringing the GEF program into the case-study process will naturally involve the GEF partners in the UN agencies, as they are the agencies most involved in preparation of national communications and other national planning exercises related to climate change and clean energy. This will ensure consistency of the dialogue with the international community. Third, GEF involvement should result in the engagement of a broader range of local stakeholders than the case-studies alone would yield. Again, the broader stakeholder base will make a more solid foundation for implementing the results of the case studies. The GEF has begun consultations with the Bank on the India review, and will be involved in the remaining four studies.

9. If these programs prove to be fruitful, GEF participation will facilitate extension of the studies beyond the initial five cases, to include other countries considered to be strategically important for clean energy worldwide. GEF's experience in working with countries to prepare national communications and climate change programs makes it well-placed to work with countries to develop national clean energy plans and strategies.

10. ***Clean Energy Technologies.*** The Bank and the GEF will need to collaborate closely in order to implement the Case Studies of Clean Energy in the Plus 5 countries (see para 8). Under the current GEF-4 Replenishment, retrofitting older, inefficient power plants has become a funding priority. The Bank has already taken advantage of this opportunity by using GEF resources to initiate a power plant rehabilitation program in India, and a project to focus on retrofitting older but relatively large coal plants while closing small, inefficient, and polluting plants is under preparation in China. These activities will benefit from a complete inventory of those plants and a clear strategy on which plants merit retrofitting and which do not. Once this initial process has run its course, the GEF and the Bank will have to shift their focus to newer power plants being designed and built with the goal of encouraging countries to adopt the latest commercially-available, efficient electricity-generating technology (such as super-critical technology) as a next step and then to begin to make use of IGCC technology when it becomes commercially available. In all of these undertakings, GEF resources are used to provide the technical assistance and programmatic costs to remove the barriers to these initiatives moving ahead. Bank financing, expertise, and financial engineering capabilities will be necessary to ensure that these initiatives lead to action on the ground and leveraging of the necessary public and private funding.

11. At present, limited funds are available under GEF-4 for the first of these initiatives (retrofitting existing power plants). If this effort is to grow to include a focus on promoting and transferring the newer, clean technologies, significantly more funds from both the public and private sectors will be needed.

12. ***Private Sector Engagement.*** The GEF is developing a program to generate global environmental benefits in a sustainable and cost-effective manner through enhanced engagement with the private sector. The GEF Council will consider at its meeting in June 2007 detailed proposals for a public-private partnership (PPP) to deepen the GEF engagement with the private sector. The Bank will be a key collaborator in the GEF PPP.

13. The framework under development is exploring a capital mobilization approach to focus investment capital on innovative technologies designed to promote clean energy production systems and address other pressing environmental problems, an initiative to improve access of smallholder farmers to global carbon markets, and financing to subsidize clean energy portfolio development costs of banks and to provide a 'soft broker' function for engaging private lenders in clean energy infrastructure development.

14. These and other initiatives will evolve as GEF engagement with private lenders matures in coming months. As World Bank client countries identify specific needs and priorities to support the goals of the CEIF, the GEF PPP will provide an innovative vehicle to attract greater private sector investment in the low carbon agenda and to partner with the private sector in addressing the identified needs and priorities of client countries.

15. ***Renewable Energy.*** Although a broad range of proven renewable energy technologies are now commercially available, few have managed to grow their markets to the point that they are truly contributing to the energy access and development agendas. Bringing these small-scale technologies on-line in full market volumes therefore needs to be part of Pillar 2 in the clean energy agenda. The menu of policy and enabling conditions under which distributed and even household renewable energy technologies make sense must be developed and approaches to up-scaling their markets identified. Many GEF projects have focused on supporting renewable energy in off-grid rural areas. These projects and technologies should be part of mainstream Bank operations now and will constitute a portion of the Bank's response to Pillar 1 of the CEIF. But close examination of this menu should help pinpoint new areas where GEF inputs may be used to catalyze market growth for innovative renewable energy technologies and take markets to scale, concentrating efforts of fewer larger commitments expected to have significant impacts.

B. Collaboration under Pillar III: Adaptation to Climate Change

16. The GEF is the world's largest funder of activities to address the adverse impacts of climate change. The World Bank is an important partner in working with the GEF to develop a broad-based international response to the challenges of adaptation.

17. Currently, there are three sources of funding to adaptation activities available under the GEF. The first is the Strategic Pilot on Adaptation funded with resources under the GEF Trust Fund to pilot concrete adaptation measures in projects with global environmental benefits. Fifty million dollars have been allocated to this initiative. The second is the Special Climate Change Fund program on adaptation. A total of $60m have been committed to this fund by donors to finance adaptation measures in key development sectors. The third is the Least Developed Countries Fund, which currently has slightly more than $100m to finance urgent and immediate adaptation projects in the least developed countries. The World Bank has already collaborated with the GEF on several projects aimed at implementing adaptation action on the ground. Donor countries are continuing to make voluntary contributions to the new funds. Additional resources for adaptation are expected from the two percent share of the proceeds of CDM projects to be contributed to an Adaptation Fund. The management of the Adaptation Fund is still under discussion in the UNFCCC Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP).

18. In addition to the programming for the various adaptation responses, the GEF and the Bank will collaborate to undertake pilot studies and projects that will advance learning on the most cost effective and sustainable means to respond to the adverse impacts of climate change. Learning is a critical element of all adaptation projects as this is a new area of sustainable development. Through a selected number of pilot initiatives, the GEF and the Bank will examine adaptation needs required to make national development plans resilient in the face of climate variability and change. In selecting projects, high vulnerability to climate change will be considered at both the local, national and regional levels and at the sectoral level. For example, pilot projects may be undertaken in an African sub-region as part of a highly vulnerable continent or in a small island state. The World Bank and the GEF have already begun piloting adaptation responses in Kiribati, a small island state in the Pacific. Another useful approach will be to focus on a sector, such as water management or agriculture, and to identify what the precise adaptation needs would be in a given national or regional context. These efforts will not only

identify how GEF's adaptation resources might be able to aid in "climate-proofing development," but also how to mainstream adaptation into the Bank's portfolio across regions and sectors and to make the Bank's own investments more climate resilient .

Additional Financing Needs. During GEF-4 (2006 – 2010), the GEF will allocate $1 billion dollars to activities in its climate change focal area. The CEIF document noted that scaling up the GEF's current focus on removing barriers for clean energy technologies would require increasing the level of GEF funding by a factor of 3. If the GEF's role were to be expanded to support the capital investment needs of new, low-GHG emitting technologies, its resources would have to be scaled up considerably more.