

**World Bank Group Progress
on Renewable Energy and
Energy Efficiency:
1990–2004**



The World Bank Group



The Energy and Mining Sector Board

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Foreword

This report describes the World Bank Group's support for renewable energy and energy efficiency from 1990 to 2004. It examines trends in lending and other forms of financial commitments for renewable energy and energy efficiency in client countries, as well as associated analytical, advisory, and capacity building services that we have provided. It serves as a companion document to the *Renewable Energy for Development* brochure, which presents the broader context of the World Bank Group's work in this area.¹

The World Bank Group's support for renewable energy and energy efficiency during the last 15 years reflects a growing appreciation among both staff and client countries of the essential role of clean, modern, and efficient energy for development. As we know, access to modern energy is synonymous with a better standard of living. Cost-effective and reliable energy helps alleviate poverty and enables economic development. No country in modern times has substantially reduced poverty without an increase in its use of energy. However, it is also true that many countries have experienced environmental degradation caused by pollutants resulting from energy production and use. Renewable energy and energy efficiency can help solve this dilemma by helping countries to meet development needs in a sustainable manner.

This report discusses the contributions made by World Bank Group institutions—the World Bank (International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA)), the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA). It also discusses renewable energy and energy efficiency projects implemented by the World Bank Group with cofinancing from the Global Environment Facility (GEF). The performance of our Carbon Finance units at the World Bank and IFC is reported as well.

This report provides the reader with a more complete picture of the efforts we have made over the past years in supporting renewable energy and energy efficiency. At the Bonn International Conference on Renewable Energies in June 2004, the World Bank Group committed to reporting its annual performance in supporting renewable energy and energy efficiency. This report is the first report of that series. It is our expectation that this report will establish a baseline for measuring progress as we move forward.

Jamal Saghir
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¹ The brochure is available at the following Website:
<http://www.worldbank.org/energy/RenewableEnergy%20Brochure.pdf>

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Acronyms and Abbreviations

AFR	Sub-Saharan Africa
ASTAE	Asia Sustainable and Alternative Energy Program
APTESI	Africa Poverty Targeted Energy Services Initiative
CER	Certified emission reduction
CDM	Clean Development Mechanism
EAP	East Asia and Pacific
ECA	Europe and Central Asia
EE	Energy efficiency
ER	Emission reduction
ERPA	Emission Reductions Purchase Agreement
ESMAP	Energy Sector Management Assistance Programme
FDI	Foreign direct investment
FY	Fiscal year (July 1 to June 30)
GEF	Global Environment Facility
GVEP	Global Village Energy Partnership
GW	Gigawatt
IBRD	International Bank for Reconstruction and Development
ICSID	International Centre for Settlement of Investment Disputes
IDA	International Development Association
IFC	International Finance Corporation
JI	Joint Implementation
LCR	Latin America and the Caribbean
MIGA	Multilateral Investment Guarantee Agency
MW	Megawatt
NGO	Nongovernmental organization
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
OP	Operational Program
PV	Photovoltaic or photovoltaic
RE	Renewable energy
SAR	South Asia
STRM	Short-term response measures
UNDP	United Nations Development Programme
WBG	World Bank Group

1. Background

There is significant evidence that suggests that if the poor had greater access to modern energy services, their lives would be improved considerably—in terms of both poverty reduction and human development. The World Bank Group’s (WBG’s) objective is to promote access to energy that is both affordable and environmentally friendly. Renewable energy (RE) and energy efficiency (EE) can not only help advance a threefold agenda—access, affordability, and environmental sustainability—but also provide benefits from energy security and economic development.

The WBG’s Energy Program stresses the importance of the following:²

- Improving access to modern energy services for the poor.
- Improving macroeconomic and fiscal balances.
- Promoting good governance and private sector development.
- Protecting the environment.

RE and EE investments support all four of the above-mentioned objectives. The World Bank’s Infrastructure Action Plan, approved by the Board of Directors in 2003, recognizes that the energy infrastructure business must change its focus from “bricks and mortar investments” to infrastructure service delivery.³ Support for RE and EE is in harmony with this objective.

RE and EE can help resolve the conflict between the seemingly contradictory objectives of helping eliminate poverty through the greater use of modern energy sources, and reducing the effect of increased energy use on the local and global environment. The WBG aims to use RE and EE to bring increased access to modern energy services for the poor with less harm to the environment.⁴ RE and EE have several benefits, such as:

- RE can help improve the livelihoods of people by accelerating the development of modern energy services at a lower cost than alternative approaches and through the promotion of income-generating activities, particularly in hard-to-reach rural and unserved areas. For example, the Uganda Energy for Rural Transformation project targets rural enterprises to help raise incomes in remote areas by providing sustainable, modern energy services.
- RE and EE can help countries grow in an environmentally sustainable way and without contributing to global warming. They can do so because carbon and other emissions from properly used RE sources are negligible, and because EE reduces the amount of energy needed. Pollution from burning fossil fuels affects both the global and local environment. According to the World Health Organization, indoor air

² Energy and Mining Sector Board, *The World Bank Group’s Energy Program: Poverty Reduction, Sustainability and Selectivity*, World Bank, Washington, D.C., May 2001.

<http://www.worldbank.org/energy/pdfs/energybrochure.pdf>

³The World Bank, *Infrastructure Action Plan*, Informal Board Meeting, July 8, 2003.

<http://www.worldbank.org/infrastructure/files/InfrastructureActionPlan.pdf>

⁴ See Annex 1 for detailed descriptions of the WBG and its various institutions and units.

pollution from cooking with biomass fuels on traditional fires contributes to the premature deaths of 2.5 million women and children each year.

- RE and EE contribute to energy security by broadening the portfolio of options for energy resources and for reducing dependence on fuels with significant price volatility and availability concerns. This reduced dependence on imported fuels improves balance-of-payments accounts and frees fiscal space for other needed spending. For example, the Senegal Sustainable and Participatory Energy Management project is addressing rising urban demand for household fuels while reducing the loss of forest cover, enhancing and diversifying local incomes, and empowering rural women.
- EE measures are often “no-regret” measures that reduce expenditures for households and businesses. The Social Infrastructure Retrofitting project for Belarus is just one example of many projects that allow client countries to capitalize on the significant cost savings and quality of life improvements possible through EE measures. The project aims to improve the quality of life for the most vulnerable groups of the population, and covers schools, kindergartens, hospitals, and residences for the elderly.

RE and EE interventions made by the WBG are driven by the development priorities and objectives of client countries. The WBG approach prioritizes the role of RE and EE as an input to poverty alleviation and economic growth. Box 1 provides examples of this approach in specific projects.

The WBG supports all forms of RE—hydropower, geothermal, wind, biomass, and solar—regardless of scale as long as they are economic and both environmentally and socially sound. Likewise, the WBG also supports the range of EE measures in use today.⁵ Many forms of RE are already economically and commercially viable compared with more conventional alternatives for specific energy applications.⁶ At the same time, some RE applications are not economic today, but they have considerable potential should their costs decline and performance improve. The WBG maintains an ongoing review of the progress of such applications.

One of the WBG’s important roles is to support those economic RE and EE activities that are unable to secure commercial financing elsewhere. This helps to leverage considerably more financing from domestic and foreign capital markets. If countries are to take full advantage of their RE resources and EE potential, they need support to overcome financing constraints, improve technical and institutional capacities, enhance knowledge, remove policy and market constraints, and overcome regulatory bottlenecks. It is the aim of the WBG to assist developing countries in achieving these objectives. The WBG accomplishes this by providing its clients with financial, analytic, and advisory services

⁵ These include any measures that result in the delivery of any energy service with a reduction in energy consumption. Demand-side management, carrier substitution, and fuel-switching measures that lead to reductions in energy demand all fall into this category. However, for counting purposes this report focuses on transport, thermal, electric, and district heating efficiency improvements.

⁶ These include hydropower, biomass fuels for cooking and heating, biomass cogeneration (for example, at sugar mills) to supply heat and electricity, geothermal energy for power and heating, solar water heating, small wind for water pumping, solar photovoltaic (PV) for remote area lighting and power, and wind electricity in selected areas.

through a technology-neutral approach. Whether for small, off-grid options to meet local needs; larger-scale, grid-connected options, such as hydropower; or for thermal energy applications; the WBG's priority is to meet client country development goals.

Box 1: A Few Examples of World Bank Group Renewable Energy and Energy Efficiency Projects

World Bank Group support for RE and EE spans the full range of sectors, applications, and technologies. It includes electricity supply using grid and off-grid means, and using a variety of wind, solar PV, biomass cogeneration, biogas cogeneration, hydropower, and geothermal solutions. EE assistance ranges from establishing building codes and standards, passive and active solar heating, district heating system improvements, efficient lightbulbs, appliance labeling, industrial process improvement, and low-temperature geothermal heating systems. These projects have been implemented in partnership with public sector agencies, private sector companies, nongovernmental organizations (NGOs), commercial banks, guarantee agencies, and microfinance organizations. Following are some examples:

- *Bangladesh:* The Rural Electrification Renewable Energy Development project finances private sector companies, NGOs, and electric cooperative–led solar home system programs. It offers technical assistance to build community awareness, establish and train solar PV service units, and support RE market development.
- *Bolivia:* The Decentralized Infrastructure for Rural Transformation project helps the government to expand and improve the delivery of rural infrastructure services through private sector–led mechanisms using renewable and other energy options. It supports electricity, as well as information and communication technology coverage expansion, and promotes productive and social uses of electricity to support income- and employment-generating activities for rural areas.
- *Colombia:* The Jepirachi Carbon Offset project contributes to the reduction of greenhouse gas emissions from the power sector in Colombia through a 20 MW wind-electricity generation facility. It also contributes to improving the welfare of the indigenous community.
- *China:* The Renewable Energy Development project supports development of a sustainable market for photovoltaics (PV) and demonstrates the viability of commercial wind development in the coastal regions. The project supports Chinese entrepreneurs to sell about 400,000 high-quality PV systems in remote areas of northwestern China and a 20 MW wind farm in Shanghai province. It assists in technology improvement and quality enhancement, and in strengthening the business capabilities of PV companies. The Passive Solar for Rural Health Clinics project introduces low-cost passive solar designs for use in cold northwestern Chinese provinces. These clinics have significantly reduced their use of coal for heating and consequently improved indoor air quality.

- *Latvia:* The Solid Waste Management and Landfill Gas Recovery project supports the production of electricity from landfill gas in a new sanitary landfill. The project was partially funded by proceeds from the sale of emission reductions (ERs), generated by the combustion of methane, to a World Bank–managed trust fund. This contributes to the financial sustainability of the project and reduces its environmental impact.
- *Lithuania:* The Klaipeda Geothermal project demonstrates the feasibility and value of using low-temperature geothermal water as a RE resource in district heating systems.

A list of all the RE and EE projects is provided in Annex 3 and is also available at

<http://www.worldbank.org/projects>, <http://www.ifc.org>

At the International Conference on Renewable Energies that took place in June 2004 in Bonn, the WBG committed to expanding its support for RE and EE. This commitment was later affirmed by the World Bank’s Board of Executive Directors during the discussion on the management response to the Extractive Industries Report in September 2004. Following are the six components of the commitment:

1. The WBG strategy—through programs and policies—will aim to ensure that economically and financially viable RE and EE investments become an essential element in the energy choices of its member nations, not marginal considerations.
2. To ensure an institutional focus on the transition toward cleaner energy sources, the WBG will set an initial target to increase its portfolio commitments for new RE and EE by 20 percent annually over the next five years. (See the definition of “new renewables” below.) This target will be reviewed on a regular basis.
3. The WBG will engage in a dialogue with nations, academic and research institutions, civil society, and industry to help frame a broader agenda on RE (including policy reform and financing).
4. To foster greater collaboration across national and institutional lines, the WBG will commit to reporting its annual performance in supporting renewable and EE programs, so that it can be measured against the figures of other leading organizations.
5. As a part of its improved reporting regime, the WBG will aim to provide sector-specific information, so it can better engage a wide range of stakeholders on trends regarding specific technologies, whether hydroelectric, wind, solar, geothermal, or biomass.
6. Finally, the WBG will increase not only its staff capacity, but also the resources at the staff’s disposal and incentives within their programs, so that it can more effectively help its country and sector teams succeed in RE and EE projects, as well as more rapidly transfer best practices across sectors and regions.

RE is defined by the WBG as energy from hydropower, wind, solar, geothermal, and biomass. Within RE, the WBG reports its commitments under two categories: new renewables and hydropower with capacity greater than 10 MW per facility.

New renewables: This is defined as energy from wind, solar, geothermal, biomass, and hydropower with a capacity less than 10MW per facility.

Hydropower (>10 MW): This is defined as energy from hydropower with a capacity greater than 10MW per facility.

This classification is merely for reporting purposes, because the WBG considers all forms and scales of hydropower to be RE.

Energy efficiency: This comprises thermal and electrical EE, as well as investments to improve the efficiency of district heating systems.

The 20 percent growth target applies to new renewables and EE only. However, the WBG will support other RE, EE, or mainstream power projects in line with requests from its clients and their country assistance strategies. As a part of the above-mentioned commitment made by the WBG at Bonn, this annual report is the first in a series of annual reports. It provides a detailed analysis of the WBG's financial and technical support to RE and EE. It also provides a baseline against which the 20 percent average annual increase in commitments to new renewables and EE may be measured.

2. Financing Activities

Among international financial institutions and bilateral donors, the WBG is one of the largest financiers of RE and EE in developing countries.⁷ This section describes the financial support for RE and EE provided by several WBG institutions and units—the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), the Carbon Finance units at the World Bank and IFC, and the World Bank executed projects with cofinancing from the Global Environment Facility (GEF)—for the years 1990–2004.

Since 1990, the WBG has committed approximately US\$8.3 billion toward RE and EE investments. As Table 1 shows, of the US\$8.3 billion toward RE and EE, nearly US\$2.3 billion, was for new renewables and US\$2.1 billion for EE. Hydropower projects (greater than 10 MW per facility) received US\$3.9 billion in commitments.

Among the various WBG institutions and units, IBRD and IDA were by far the largest contributors with US\$6.1 billion in commitments from FY 1990 to FY 2004. Of this US\$6.1 billion, almost US\$3 billion was committed toward new renewables and EE. The WBG-administered GEF commitments were US\$754 million. IFC contributed US\$860 million in commitments, of which almost US\$300 million was toward new renewables and EE.

⁷ *Source:* G8 Renewable Energy Task Force Report, Annex 2. Japan, Germany, France, and Italy account for a significant portion of official development assistance (ODA) for renewable energy.

Table 1: World Bank Group Renewable Energy and Energy Efficiency Commitments, FY 1990–2004

(millions of U.S. dollars)

<i>Sources</i>	<i>Total</i>	<i>Renewable energy</i>		
		<i>Hydropower greater than 10 MW</i>	<i>“New” renewables: solar, wind, geothermal, biomass, and hydropower (<10 MW)</i>	<i>Energy efficiency and district heating</i>
<i>Direct investment</i>				
IBRD/IDA	6,145	3,169	1,266	1,710
IFC ^a	860	563	204	93
GEF–IBRD/IDA	617	0	366	251
GEF–IFC	137	0	88	48
Special financing ^b	20	0	0	20
<i>Financing that leverages investments</i>				
MIGA	428	113	311	5
IBRD Carbon Finance	68	19	36	13
Total	8,275	3,864	2,270	2,141

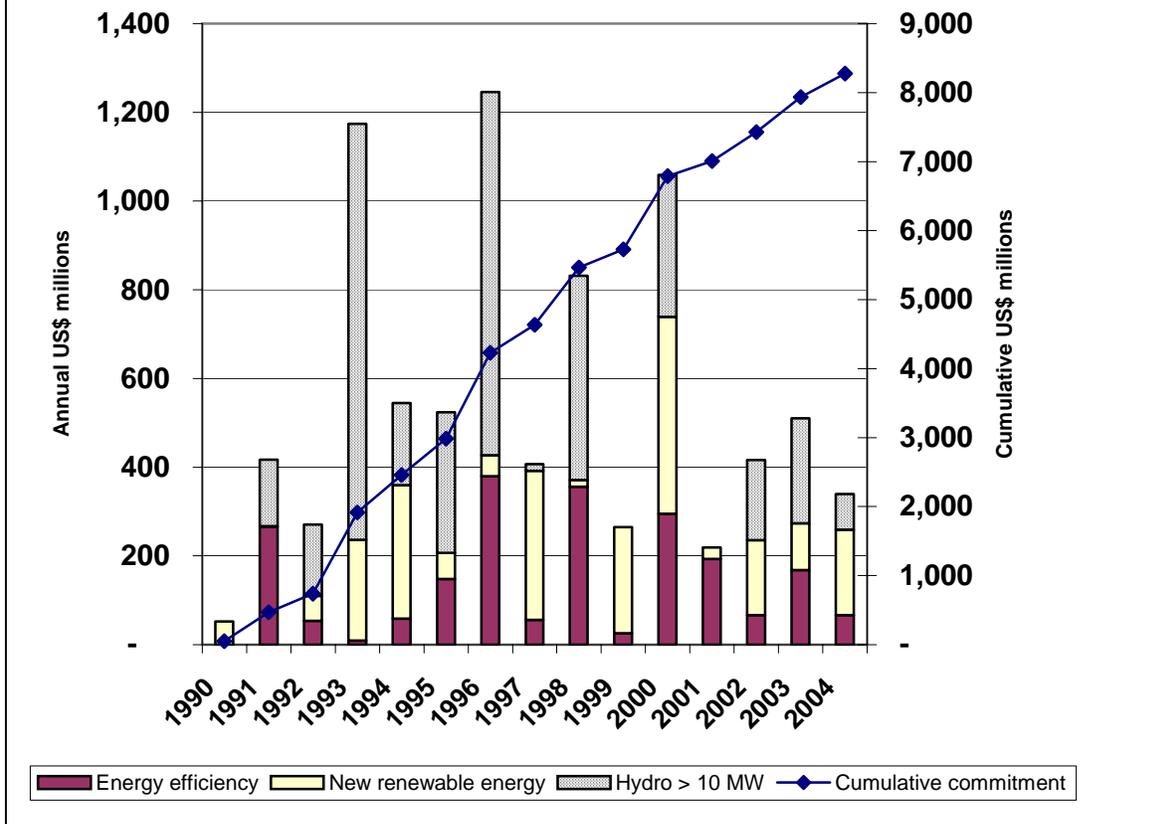
a. IFC’s actual RE/EE investment commitments are likely underestimated. Some investments are not captured through management information systems or are difficult to identify within larger IFC project investments, corporate loans, or capital market operations because they may be classified under other sectors (for example, industry, agriculture).

b. These include Project Startup Advances, Trust Fund Credits, and similar special facilities.

In 1991, the WBG’s commitments toward new renewables and EE were 20 percent of its total commitments to the power sector. By 2004, this proportion had increased to approximately 33 percent. Because WBG support for RE and EE, as for all forms of energy, is driven by demand from its client countries, there is considerable year-to-year variation in commitment levels (see Figure 1).⁸

⁸ Detailed annual tables that show the WBG commitments for RE and EE by region and institution are provided in Annex 2.

Figure 1: WBG Renewable Energy and Energy Efficiency Commitments, 1990–2004



As noted above, one of the six commitments made by the WBG at the Bonn Conference is to increase the portfolio of new renewables and EE commitments by 20 percent annually during the next five years. The baseline against which the 20 percent increase may be measured is provided by Table 2. The level of a 20 percent increase annually during the next 5 years is equivalent to more than doubling the current baseline of about US\$209 million per year. The baseline of US\$209 million is the approximate average annual commitment for new renewables and EE made by IBRD/IDA, IBRD Carbon Finance and GEF (IBRD/IDA) in the three years FY 2002, FY 2003, and FY 2004.

The baseline is based on the past commitments made by the World Bank through IBRD and IDA lending, associated GEF cofinancing and Carbon Financing. These commitments are usually based on three-year rolling agreements that are made between the World Bank and client countries and incorporated in the Country Assistance Strategy. Hence, such investment plans can be influenced through the World Bank’s dialogue with the country, and can be supported through analytical work. IFC and MIGA commitments were not used in computing the baseline because this assistance is focused on the private sector, which is demand-driven and less influenced by the World Bank or country strategic planning assistance.

Table 2: Baseline: Annual Lending Commitments for New Renewables and Energy Efficiency, FY 2002–04

(millions of U.S. dollars)

<i>Institution</i>	<i>FY 2002</i>	<i>FY 2003</i>	<i>FY 2004</i>	<i>Average</i>
IBRD/IDA	163	98	129	130
GEF–IBRD/IDA	37	70	83	64
IBRD Carbon Finance	4	10	33	15
Total commitment	204	178	245	209

With respect to new renewables, WBG commitments have increased steadily since the 1990–94 period, with commitments during 2000–04 being almost 47 percent higher than the comparable period 1990–94 and 34 percent higher than the commitments during 1995–99. See Table 3 for details.

Table 3 also shows that EE commitments have more than doubled in the last five years compared with the commitments in the 1990–94 period, but declined compared with 1995–99. The rise in the 1995–99 period is attributable mainly to the surge in demand for EE assistance from the newly independent states in Europe and Central Asia. Hydropower (>10 MW) commitments in the 2000–04 period dropped from their 1990–94 and 1995–99 levels, although there was an increase of 12 percent during the 1995–99 period as compared with 1990–94.

Table 3: Trends in World Bank Group Renewable Energy and Energy Efficiency Commitments, 1990–2004

(millions of U.S. dollars)

<i>Type of commitment</i>	<i>FY 1990–94</i>	<i>FY 1995–99</i>	<i>FY 2000–04</i>	<i>Total</i>
New renewables	638	696	936	2,270
Hydropower > 10 MW	1,434	1,612	818	3,864
Energy efficiency	387	964	789	2,141
Total	2,459	3,272	2,544	8,275

Since 1990, the WBG has supported more than 220 RE and EE projects in approximately 70 countries. These projects represent a diversity of technologies and applications that benefit rural and urban communities.

A notable feature of WBG commitments toward new renewables and EE is that since 1995, they typically have been spread over more projects. For example, in 1991 and 1993, single large projects made up the bulk of the commitment: Poland Heat Supply Restructuring and Conservation in 1991 (US\$265 million) and India Renewable Resources in 1993 (US\$190 million). However, since 1995, new renewables and EE

commitments have been spread over a larger number of projects and countries (Table 4). This suggests that the breadth of the support provided is increasing.

Table 4: Trends in World Bank Group New Renewable Energy and Energy Efficiency Commitments and Projects, 1990–2004

<i>Commitments and projects</i>	<i>FY 1990–94</i>	<i>FY 1995–99</i>	<i>FY 2000–04</i>	<i>Total</i>
<i>New renewable energy</i>				
Commitment (US\$ millions)	638	696	936	2,270
Number of projects	16	38	62	116
<i>Energy efficiency</i>				
Commitment (US\$ millions)	387	964	789	2,141
Number of projects	8	35	45	88

Note: The number of projects cannot be aggregated, because some projects have both new renewables and EE components.

On a regional basis, the East Asia and Pacific (EAP) (35 percent) and Europe and Central Asia (ECA) (21 percent) regions received the highest level of commitments for RE and EE. Approximately 13 percent of the commitments were for projects in South Asia (SAR) and 16 percent for those in the Latin America and the Caribbean (LCR) region (see Table 5). Sub-Saharan Africa's (AFR) share is 11 percent. The EAP, ECA, and SAR regions had declining commitments in the last five years compared with 1995–99. This is largely a result of declining commitments in hydropower greater than 10MW and declining commitments for EE projects (especially in ECA).

Table 5: Regional Trends in World Bank Group Renewable Energy and Energy Efficiency Commitments, 1990–2004

(millions of U.S. dollars)

<i>Region</i>	<i>FY 1990–94</i>	<i>FY 1995–99</i>	<i>FY 2000–04</i>	<i>Total</i>	<i>Share of total (%)</i>
Africa	402	252	281	935	11
East Asia and Pacific	891	1,174	868	2,933	35
Europe and Central Asia	323	788	615	1,726	21
Latin America and Caribbean	617	318	363	1,298	16
Middle East and North Africa	2	4	40	46	1
South Asia	223	532	350	1,106	13
Global ^a	0	204	27	231	3
Total	2,459	3,272	2,544	8,275	100

a. These are projects that span more than one region.

Table 6 shows WBG commitments toward new renewables by region. AFR is the standout performer and has consistently increased its contribution from a mere US\$22 million in the period 1990–94 to US\$219 million in the period 2000–04. ECA and LCR have more than doubled their commitments toward new renewables in the last five years compared with the 1994–99 period. Although SAR scaled up support almost tenfold during the last five years, the US\$29 million in the period 1995–99 was unusually low for SAR.

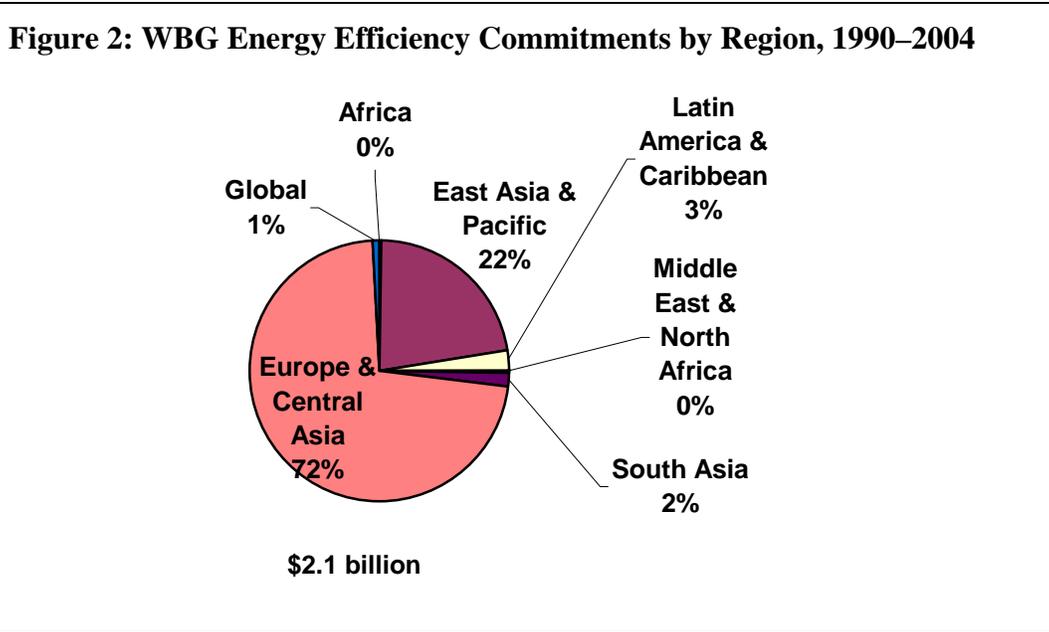
Table 6: Regional Trends in World Bank Group New Renewable Energy Commitments, 1990–2004

(millions of U.S. dollars)

<i>Region</i>	<i>FY 1990–94</i>	<i>FY 1995–99</i>	<i>FY 2000–04</i>	<i>Total</i>
Africa	22	51	219	292
East Asia and Pacific	351	302	58	711
Europe and Central Asia	0	22	65	86
Latin America and Caribbean	41	104	271	415
Middle East and North Africa	0	4	40	44
South Asia	223	29	257	510
Global ^a	0	185	27	212
Total	638	696	936	2,270

a. These are projects that span more than one region.

The WBG’s EE commitments have been primarily concentrated in the ECA and EAP regions. Almost 94 percent of the WBG’s US\$2.1 billion commitments were in ECA (72 percent) and EAP (22 percent). See Figure 2.

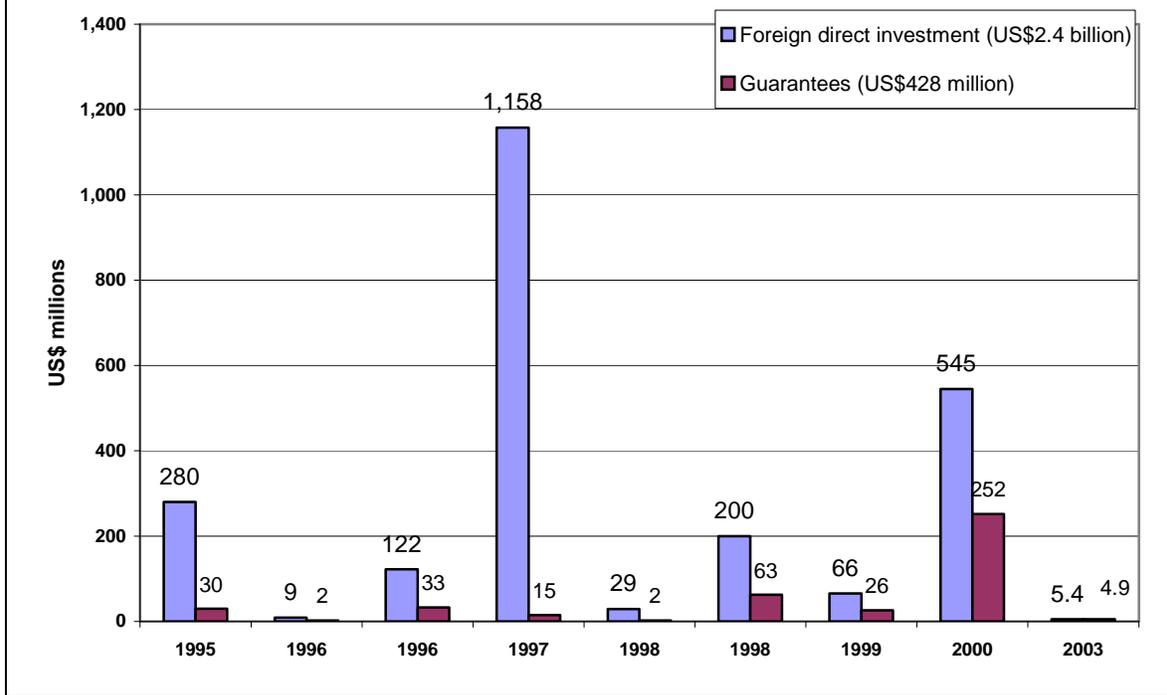


An often underappreciated aspect of the WBG’s lending is its ability to leverage investments from other resources through its direct investments and through MIGA and the Carbon Finance business. In the case of IBRD/IDA projects, an examination of 27 RE and EE projects showed that on average, for every dollar committed, IBRD/IDA assistance leveraged US\$2.80 in public and private financing.⁹

In contrast to IBRD/IDA and the GEF, which provide project finance, MIGA provides political risk insurance against noncommercial risks to eligible foreign investors and commercial banks for qualified investments in developing member countries. This leverages much-needed foreign direct investment (FDI). MIGA provided guarantees of US\$428 million to RE and EE projects in the period 1995 to 2004. This helped leverage FDI of US\$2.4 billion (see Figure 3). Specifically, for new renewables, MIGA provided guarantees of US\$311 million, which leveraged FDI of US\$900 million. In the last five years, MIGA provided US\$252 million in guarantees toward new renewables.

⁹ The leverage varies considerably among different projects. For the 27 projects analyzed, the range was between US\$0.30 and US\$6.40 leveraged per dollar of IBRD/IDA financing. On average, each dollar of commitment by the IBRD/IDA leveraged US\$1.10 for EE projects, US\$1.90 dollars for new renewables projects, and US\$4.00 for hydropower (>10MW) projects.

Figure 3: MIGA Guarantees and FDI Leveraged for Renewable Energy and Energy Efficiency, 1995–2003



The Carbon Finance business launched in FY 2000 is a relatively new business for the WBG. In the past few years, the Carbon Finance business has demonstrated innovative ways to leverage private investment in climate-friendly technologies. Carbon payments can dramatically improve the returns on climate-friendly investments. For RE and EE projects, the high quality of cash flows from carbon sales can be catalytic in helping projects secure upfront financing.¹⁰ The entry into force of the Kyoto Protocol is expected to have a strong positive impact on the carbon market. The WBG has two Carbon Finance business lines: IBRD Carbon Finance and IFC Carbon Finance.

As of June 2004, the IBRD Carbon Finance business had US\$415 million under management in five facilities for the purchase of greenhouse gas ERs. From FY 2001 to FY 2004, it signed Emission Reductions Purchase Agreements (ERPAs) of approximately US\$68 million toward RE and EE projects, of which almost US\$50 million was toward new renewables and EE. IBRD carbon finance commitments toward new renewables have grown rapidly from US\$2 million in 2001 to US\$19 million in 2004. These ERPAs have facilitated the investment of more than US\$500 million in RE and EE.

¹⁰ These carbon payments are sourced in the United States, denominated in Euros or U.S. dollars, and backed by unconditional promissory notes from Fund participants, all of which are investment grade. As a result, carbon revenues are free of cross-border currency convertibility and transfer risk. These features enable project sponsors to borrow on favorable terms against these high-quality revenues. See *Prototype Carbon Fund Annual Report 2002*, p. 37.

The IFC Carbon Finance unit also purchases greenhouse gas ERs (also known as carbon credits) and is developing new products to help buyers and sellers mitigate risks in the emerging carbon market. The IFC manages two facilities to purchase carbon credits on behalf of the Government of the Netherlands under the international trading mechanisms of the Kyoto Protocol. As of June 2004, IFC had about US\$85 million under management in the two facilities to purchase credits.

Although the bulk of the commitments for new renewables and EE continue to be provided by IBRD/IDA, in the last five years GEF and MIGA support has expanded significantly. This trend can be seen in Table 7, which shows that in the period 2000–04, GEF and MIGA increased their commitments by 15 percent and 50 percent, respectively, compared with the period 1995–99.¹¹ IBRD Carbon Finance is a new business, and therefore has no historical data. The support from IBRD/IDA and IFC has declined because of declining commitments in hydropower projects greater than 10MW. However, this trend could reverse, as the Water Resources Sector Strategy and the Infrastructure Action Plan, endorsed by the Board of Executive Directors in 2003, call on the WBG to re-engage in infrastructure of all sizes, including large hydropower.

Table 7: Institutional Trends in WBG Renewable Energy and Energy Efficiency Commitments, 1990–2004

(millions of U.S. dollars)

<i>Institution</i>	<i>FY 1990–94</i>	<i>FY 1995–99</i>	<i>FY 2000–04</i>	<i>Total</i>
GEF–IBRD/IDA	95	207	315	617
GEF-IFC	0	99	38	137
IBRD Carbon Finance	0	0	68	68
IBRD/IDA	2,056	2,377	1,712	6,145
IFC	308	399	154	860
MIGA	0	171	257	428
Special Financing	0	20	0	20
Total	2,459	3,272	2,544	8,275

During the last fifteen years, the WBG has supported a wide range of RE technologies, including biomass, hydropower, solar thermal, solar heating, wind, and geothermal. Since almost half of the WBG’s new renewable projects support more than one renewable technology, it is not possible to estimate the precise level of financial support for each technology. Table 8 shows the number of projects that supported each type of RE technology. It must be noted that the number of projects in this table cannot be aggregated because single projects have supported multiple technologies.

¹¹ MIGA provided US\$252 million in guarantees for two projects in 2000. However, since then MIGA has not provided guarantees for new renewables projects.

Table 8: Project Support for Renewable Energy Technologies, 1990–2004

<i>Renewable energy technology</i>	<i>Number of projects</i>
Biomass	27
Hydro (>10 MW)	39
Hydro (<10 MW)	32
Solar thermal	5
Solar PV	19
Geothermal	13
Wind	12

3. Analytic and Advisory Services

Considerable preparatory work is required to identify suitable RE and EE investment opportunities and to build capacity. The WBG’s analytic and advisory services accomplish this crucial task. The WBG provides a wide variety of analytic and advisory services to help meet the development needs of individual countries and the international community. These services include several products, such as reports that focus on important issues; policy notes; technical, economic, financial, and market assessments; training and workshops; and conferences. All are designed to provide information for policy discussions, support the development and implementation of country strategies, formulate effective lending programs, build institutional capacity, establish legal and regulatory frameworks, and provide knowledge.

Increasingly, RE and EE are being integrated into important planning documents of client governments and the WBG. For individual countries, a program of analytical work called Economic and Sector Work is set out in the World Bank’s Country Assistance Strategies—business plans to which both the World Bank and the countries agree. The World Bank’s assistance to each borrower’s development needs is tailored according to this business plan. These plans are closely aligned with country priorities, and broad dissemination of the completed work is standard practice.

Often WBG projects include considerable technical assistance in addition to investment support. For example, the WBG has supported RE market assessments in various countries, helped introduce regulations and contractual instruments for grid and off-grid renewables, and introduced appliance labeling programs. It has also supported the establishment of PV testing laboratories, funded technology improvement programs, and contributed to knowledge sharing among countries on RE and EE.

The WBG also has special partnerships with donors that provide specific support to RE and EE analytic and advisory activities, as well as projects. These include the Energy Sector Management Assistance Programme (ESMAP), the Asia Sustainable and Alternative Energy Program (ASTAE), and the Africa Poverty Targeted Energy Services Initiative (APTESI). From 1997 to 2004, ESMAP funded 60 RE and EE projects at a total cost of approximately US\$14 million—US\$9 million for RE and US\$5 million for EE. From 1992 to 2002, ASTAE supported 39 RE and/or EE projects in the EAP and SAR regions. ASTAE projects have helped to avoid 1.3 GW of fossil fuel-fired

generation capacity and have provided more than 600,000 households in remote rural areas access to modern energy services.¹² Following are some examples of analytical and advisory work on RE and EE by these partnerships:¹³

- Support for the Global Village Energy Partnership (GVEP). GVEP is a 10-year, implementation-based partnership that seeks to increase access to modern energy services in a manner that enhances economic and social development and reduces poverty.
- An Energy-Poverty-Gender study, with research and operational components and country studies in China, Indonesia, and Sri Lanka that focus on identifying the relationship between access to electricity generated from renewable resources and poverty alleviation and gender equity.
- Cross-country technical assistance and knowledge sharing among Brazil, India, and China on commercial financing of EE investments. The project permits countries to learn from each other's experiences in engaging commercial banks, energy service companies, and other entities in financing EE operations.
- Preparing of rural and RE action plans for a number of countries, including Vietnam, Papua New Guinea, and Lao PDR. The plans were prepared in a participatory process in consultation with stakeholders to identify RE potential, problems, and solutions, and to synthesize study results.
- Assistance for countries to review, formulate, and implement policies and programs in the biomass and biofuels sector, to rationalize the structure and functioning of the sector within an environmentally sustainable framework, and to promote an orderly energy transition with the full participation of stakeholders.
- Practitioners Workshop on Decentralized Electrification that brought together practitioners from the SAR region to learn from each other's experiences in using RE-based electricity approaches.
- Assistance for China to develop a Renewable Energy Law that is expected to adopt a mandated market share policy. This groundbreaking work will form the foundation for the forthcoming China Renewable Energy Scale-Up Project that is expected to be the largest single RE operation supported by the WBG to date.
- Assistance to the Shanghai government to develop a green electricity framework. The Shanghai Jade Electricity scheme will permit Shanghai residents to participate in protecting the environment and to develop more RE-based generating capacities.
- Quality Processes for Photovoltaics that were used to develop training modules to improve PV manufacturing, testing, design, installation, and maintenance services.
- Introduction of new planning methods for electricity generation in Mexico that can take into account the role of intermittent generation sources, such as wind power, in mitigating fuel price volatility risks.
- Cross-country comparisons of lessons learned in implementing standard small power purchase agreements for small-scale RE generation to identify good practices.

¹² See Annex 1 for details about the WBG partners.

¹³ For reports on these and other assistance by such partnerships, see the publications posted at <http://www.worldbank.org/esmap>, <http://www.worldbank.org/astae> and <http://www.worldbank.org/energy>.

4. Lessons Learned

Over the years, the WBG has gained valuable experience and has learned several important lessons on how best to achieve the objective of supporting RE and EE. Some of the important lessons are discussed in this section.

Identifying Opportunities

Given the newness of RE and EE options in many countries, it has been critically important to engage the countries in identifying and assessing opportunities through Economic and Sector Work. It is necessary to proactively assess RE and EE issues and options early and comprehensively to serve as input to country dialogue and important planning documents, such as Poverty Reduction Strategy Papers and Country Assistance Strategies. These investigations help define the following:

- RE and EE roles in meeting the Millennium Development Goals and in enhancing local economic growth, business development, and employment.
- Important risks and benefits to clients from a business-as-usual approach to provide a rationale for the reasons to invest in RE or EE.
- Specific RE and EE investment opportunities that are economically justified and sustainable.
- Policy and regulatory changes and effective governance issues that need to be addressed. These are essential prerequisites for success in scale-up because much of the investments and project implementation is undertaken by the private sector, community organizations, and civil society.
- Capacity and market infrastructure that are needed to facilitate scale-up. This work needs to be done in close coordination with and in direct support of investments, or the capacity built will dissipate.

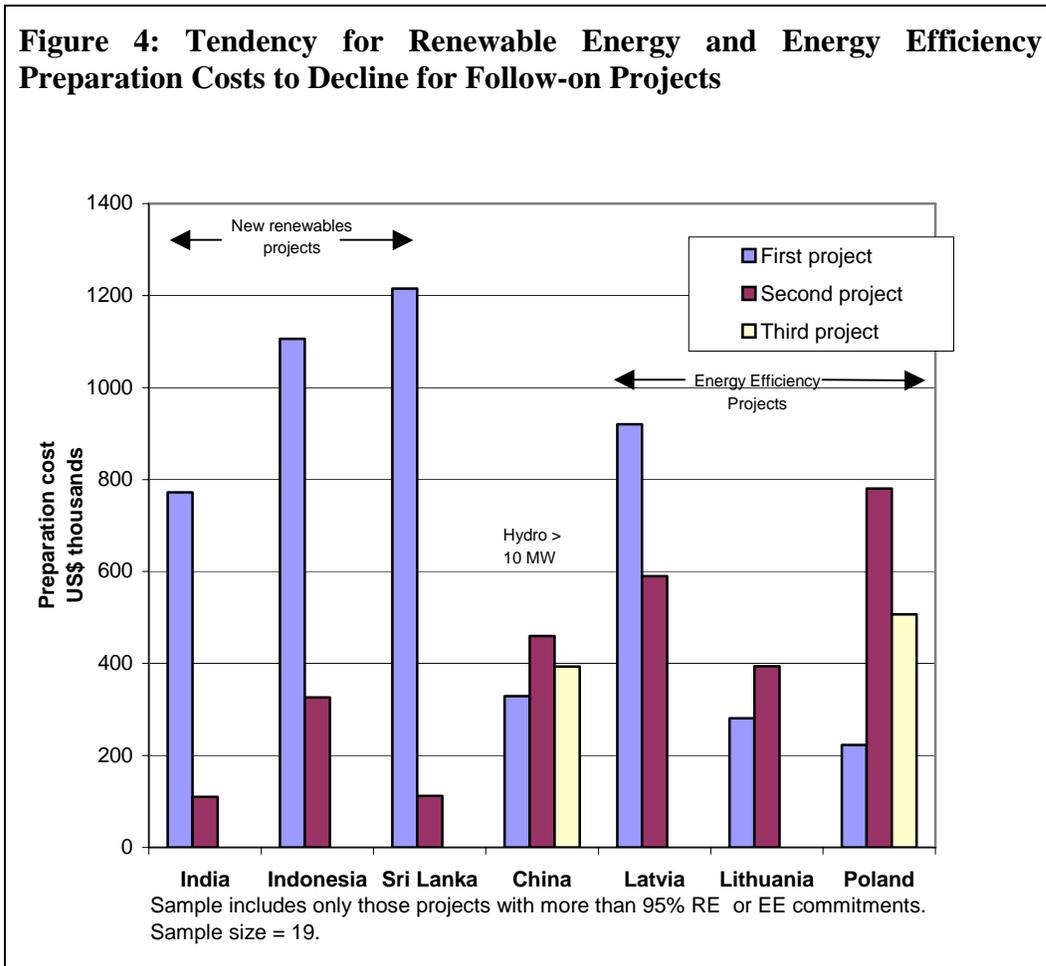
This Economic and Sector Work is done in collaboration and in coordination with related planning work being done by various partnerships, such as ESMAP, ASTAE, and the GVEP, in order to build synergies and avoid duplication.

Learning Effects

The costs associated with preparing and supervising World Bank RE and EE projects have declined during the last decade as a result of significant “learning effects.” However, the cost of preparation remains relatively high and time-intensive for the “first-off” RE and EE projects in a country, compared with, for example, power projects. This is principally a result of the need to devote significant resources and time toward intensive capacity building, and toward expanding the knowledge base and upstream sector work. Once this capacity is built, subsequent follow-on projects can be prepared at a cost comparable to other more mainstream energy projects.

As a result of the higher costs for preparing first-off projects, most WBG projects with RE and EE components have used trust funds and GEF assistance to cover project preparation expenses. For example, the first US\$55 million RE and EE energy project in Sri Lanka required about US\$1.2 million to prepare and took 33 months (from project concept to Board approval). The second RE and EE project (US\$134 million) required

only US\$112,000 to prepare and took 7 months. Figure 4 illustrates this finding across several RE and EE projects in a number of countries. As can be seen, this trend is more pronounced for RE projects than for EE and hydropower (> 10MW) projects.¹⁴



Creating the Enabling Conditions

Given the enormous financing needs for the energy sector relative to the support available through the WBG, the Bank’s support must leverage considerably more resources from other public and private sources. This is equally, or even more applicable, for RE investments because they tend to be more capital intensive. The WBG’s role must therefore include considerable support to creating the market-enabling conditions that will encourage others to invest in energy, and to using innovative financing instruments,

¹⁴ These preparation costs comprise direct World Bank expenditures and Trust Funds provided to the country by the World Bank for preparation purposes.

including risk mitigation measures, to leverage more financing from other sources. Critical factors include essential market-enabling conditions, such as the following:

- *Commercial environment:* Supportive commercial, legal, and policy environment for private enterprises, NGOs, and community organizations willing to deliver energy services.
- *Markets:* Favorable market characteristics and customer base (that is, access to customers with the ability to pay for energy services and/or mechanisms for increasing the affordability of energy services for the poorest).
- *Policy environment:* Supportive public policies and legal and regulatory frameworks that reduce investor risks and level the playing field to foster delivery of least-cost energy services.
- *Infrastructure:* Functioning institutional, commercial, financial, and technical infrastructure, or the ability to build it.
- *Financing:* Availability of accessible and affordable financing for energy enterprises, consumers, and energy investments.

IFC’s experiences highlight the necessity of creating the enabling conditions to support alternative energy investments. IFC found only a limited number of high-quality non-hydropower (wind, biomass, geothermal) RE projects available with attractive returns, and only a small number of active sponsors. This is partly a result of the lack of regulatory frameworks that allow private developers to make an adequate return on investment. Many RE projects also lack full financial cost competitiveness compared to the conventional alternatives they would displace. Business development has been further hampered by a lack of good information about the resources and limited knowledge about the technologies and business opportunities. Moreover, projects are smaller in size than typical power sector projects, and developers face many other types of market barriers. In such cases, the WBG’s ability to engage governments and help condition the market has been crucially important in scaling up RE and EE investments in a sustainable manner.

Role of Subsidies

Well-designed and applied subsidies are beneficial in making economically sound RE investments financially viable, particularly for rural energy applications where capacity to pay is limited. Subsidy schemes that are economically rational, performance-based, and time-bound have been found to be quite effective. Buying down the initial cost appears to be preferable to subsidizing the recurring costs because the long-term availability of funds for paying recurring costs is never assured. However well intentioned, inappropriate subsidies such as “give-away” programs or equipment dumping have seriously damaged nascent RE markets. These types of subsidies discourage entrepreneurs and raise expectations among consumers that cannot be met. Equally damaging are subsidies provided for fuels, such as kerosene, diesel, or grid-based electricity purportedly to benefit the poorest. Such subsidies often may not reach the poorest and may discourage economically rational energy purchase decisions.

Capacity Building and Knowledge Creation and Dissemination

Capacity building and knowledge creation and dissemination must be integral components of projects and must complement the financial resources provided for

investments in RE and EE. Such assistance is essential for the success of a project and for the sustainability of RE and EE interventions over the long term. Following are some of the capacity building and knowledge-creating activities:

- Providing assistance in energy planning to ensure that RE and EE are fully considered in energy investment decisions.
- Establishing regulatory and legal frameworks for encouraging use of RE and EE.
- Strengthening businesses and financial institutions to support RE and EE.
- Testing and labeling programs for energy efficient appliances.
- Training for policymakers and for implementers.
- Renewable resource and market assessments.
- Monitoring and evaluation support.

5. The Road Ahead

The energy challenge faced by developing countries is enormous. Today, 1.6 billion people lack access to electricity, and 2.4 billion rely on traditional biomass for cooking and heating. Indoor air pollution contributes to 2.5 million premature deaths a year and is among the leading causes of illness and death in developing countries. According to the International Energy Agency's 2003 *World Energy Investment Outlook*, the power sector investment needs of developing countries during the next 25 years are approximately US\$5 trillion. This is vastly greater than WBG commitments to the power sector, which have ranged from US\$715 million to US\$3.6 billion per year.

Hence, the WBG strategy is to use its capacity and resources to leverage greater investments from other sources, including FDI and domestic capital markets. For RE and EE, this means paying more attention to the following:

- Building capacity.
- Engaging public and private sectors to mainstream RE and EE in all energy decisions.
- Greater use of guarantees and carbon finance to leverage financing.
- Removing barriers to the development of markets for RE and EE.
- Strengthening the policy and regulatory frameworks for RE and EE.

The WBG will also explore synergies among diverse forms of RE. Not all sources of power are interchangeable, and the intermittent nature of some RE sources—such as wind and solar—provides different services from those of more continuous RE sources, such as geothermal and hydropower. Exploring ways in which these diverse RE sources can work in harmony may help to fill the gap in terms of the limitations of individual technologies.

In the near term, the WBG is providing greater support to RE and EE project preparation to ensure that they are adequately represented in the project pipeline. In the longer term, the WBG will continue to support a program of upstream analytical work and planning studies that will provide the necessary information and rationale for scaling up access to RE and EE. The WBG will assist its clients to ensure that RE and EE are integrated into strategy documents, such as Country Assistance Strategies and Poverty Reduction

Strategy Papers. The WBG will also continue to work with client countries to enhance mobilization of domestic capital sources for RE and EE projects and programs.

It is vital that the WBG utilize its leveraging capacity effectively. The WBG is exploring several options to further improve instruments to mobilize financing, including IBRD/IDA for investment lending, GEF for incremental cost financing for global environmental benefits (barrier removal), MIGA for risk insurance, and Carbon Finance for improving financial sustainability of investments. The WBG will focus on developing more effective means for collaborating with GEF and carbon finance operations and for greater engagement of the private sector.

The WBG is conducting a scoping study for the formation of a Financing and Policy Network for Renewable Energy and Efficiency Scaling-Up in Developing Countries. Working closely with the Government of Germany, the study will assess the need for such a network and, if necessary, its function. This work complements the Renewable Energy Global Policy Network that the German government is supporting.

The WBG is also in the process of developing several knowledge products. Prominent among these is an operational guidance note for RE and a toolkit and handbook for RE development. Some of the other studies that the WBG is conducting are noted in Box 2.

Box 2: Representative Knowledge Products under Development

1. The Renewable Energy Technology Characterization Study. The study will present comparative cost and performance data for renewable and conventional electricity generation and supply for grid, minigrid, and off-grid applications.
2. Baseline studies and incremental cost analysis of biomass and coal utilization technologies for use in GEF and carbon finance project assessment.
3. Simplified guidebooks for nonenergy specialists on the application of RE for provision of health, education, and community water supply services.
4. Estimates of RE opportunities and investment implications of commitments made by developing countries in Bonn. This report estimated that the investment requirements up to 2015 were of the order of US\$100 billion for developing countries.

Historically, the WBG has been one of the world's leading providers of financial, analytical, and advisory services in the area of RE and EE. The importance of RE and EE for providing the poor of the world with greater access to energy services and ensuring environmental sustainability cannot be overemphasized. During the next five years, the WBG will scale up its support to RE and EE even further, with its 20 percent per year increase in RE and EE commitments. The emphasis will not be solely on numbers and commitments, but rather on outcomes. Progress on core development outcomes in client countries will be the primary indicator of success.

In order to accomplish the investment scale up in RE and EE, the WBG has begun establishing the foundation upon which the scale-up can be built successfully. The WBG is particularly keen to ensure that it uses its leveraging capacity to the fullest to attract investments from various other sources. With this annual report the WBG has provided a baseline against which its future performance in the area of RE and EE may be measured.

Annexes

Annex 1: Institutional Support for Renewable Energy and Energy Efficiency

This section describes the various WBG institutions and units and the role that each plays in contributing to RE and EE. It also provides detailed definitions of RE and EE. Last, it discusses the methodology used to compute the data in this report.

The World Bank Group

In this report, the World Bank Group (WBG) refers to four closely associated World Bank institutions, which directly support RE and EE activities.¹⁵ The four institutions are the IBRD, IDA, IFC, and MIGA. The report disaggregates the commitments made by these institutions. In addition, the WBG is an implementing agency for the GEF. This report provides information on WBG-administered GEF projects. The WBG's Carbon Finance business is reported separately because it is a unique business line that purchases emissions reductions and does not directly invest in a project.

IBRD

The International Bank for Reconstruction and Development (IBRD) aims to reduce poverty in middle-income and creditworthy poorer countries by promoting sustainable development through loans and guarantees, and in the nonlending area analytical and advisory services. The income that IBRD has generated over the years has allowed it to fund several developmental activities and to ensure its financial strength, which enables it to borrow in capital markets at low cost and to offer clients good borrowing terms. One hundred and eighty-four countries are members of the IBRD.

<http://www.worldbank.org/ibrd>

IDA

Contributions to the International Development Association (IDA) enable the World Bank to provide approximately US\$6–9 billion a year in highly concessional financing to the world's 81 poorest countries (home to 2.5 billion people). IDA's interest-free credits and grants are vital because these countries have little or no capacity to borrow on market terms. In most of these countries, the great majority of people live on less than US\$2 a day. IDA's resources help support country-led poverty reduction strategies in important policy areas, including raising productivity, providing accountable governance, improving the private investment climate, and improving access to education and health care for poor people. One hundred and sixty-five countries are members of the IDA.

<http://www.worldbank.org/ida>

IFC

The International Finance Corporation's (IFC's) mandate is to further economic development through the private sector. Working with business partners, it invests in

¹⁵ There is a fifth institution that is a part of the WBG: the International Centre for Settlement of Investment Disputes (ICSID). Because this institution does not directly support any RE or EE activities, for this annual report "WBG" precludes ICSID.

private enterprises in developing countries and provides long-term loans, guarantees, and risk management and advisory services to its clients. The IFC invests in projects in regions and sectors underserved by private investment and finds new ways, including innovative financial modalities and business models, to develop promising opportunities in markets deemed too risky by commercial investors in the absence of IFC participation. <http://www.ifc.org>

GEF

The Global Environment Facility (GEF), which is the World Bank's largest partner in the area of RE and EE investments, provides both project preparation services and investment funds. The GEF is the financing mechanism for a range of international environmental agreements, and it provides financing for projects that have global environmental benefits. Since the establishment of the GEF in 1991, the WBG institutions have worked closely together to implement the GEF's role as the financial mechanism for the United Nations Framework Convention on Climate Change.

The GEF classifies projects under various Operational Program (OP) numbers and as Short-Term Response Measures (STRM).¹⁶ OP5 is related to EE. OP6 and OP7 are both related to RE. District heating is usually under OP5, but in the case of geothermal district heating systems, would be OP6. OP11 is for transport and has been considered EE in this report. An STRM could be either EE or RE. For the sake of simplicity, in this annual report, STRM projects are considered RE projects. <http://www.worldbank.org/gef>

MIGA

The Multilateral Investment Guarantee Agency (MIGA) provides political risk insurance against noncommercial risks to eligible foreign investors and commercial banks for qualified investments in developing member countries. MIGA can provide political risk coverage for loans with tenors of up to 15–20 years and flexible repayment schedules. It also provides coverage for cross-border loans that finance local costs.

Project risks that MIGA can cover for both equity investors and lenders are Transfer Restriction, Expropriation, Breach of Contract, and War and Civil Disturbance. In particular, Expropriation and Breach of Contract coverage could cover regulatory risks that investors and lenders face where either the regulatory environment is untested, or the project is regulated by contract.

MIGA is considering providing risk coverage on losses under the ERPAs, if a project is not able to generate certified emission reduction (CER) credits because of political risks.¹⁷ This could be of great interest to those purchasers of CERs who are prepared to

¹⁶ OP6 Promoting the adoption of renewable energy by removing barriers and reducing implementation costs.

OP-7 Reducing the long-term costs of low greenhouse gas-emitting energy technologies.

OP-5 Removal of barriers to energy efficiency and energy conservation.

OP-11 Promoting environmentally sustainable transport.

¹⁷A new segment in the project finance market has emerged where Organisation for Economic Co-operation and Development (OECD) governments and companies are entering into Emission Rights Purchase Agreements (ERPAs) to buy carbon credits from clean energy projects from emerging countries. OECD countries and companies use these certified emission reduction (CER) credits against their obligations under the Kyoto Protocol and related agreements.

make a prepayment on the ERPAs, thereby providing a further source of finance to climate-friendly projects at the investment finance stage, and making the project more bankable (see the subsection on Carbon Finance below).

<http://www.miga.org>

Carbon Finance

Both the IBRD and IFC have Carbon Finance units that leverage public and private investment for projects that generate greenhouse gas ERs. This helps to grow the market by extending carbon finance to both developing and transition economies. The funds are provided by private companies and governments seeking to purchase ERs to learn how to originate transactions in this complex emerging market.

Typically, climate-friendly projects tend to be highly capital-intensive, so that even if they are competitive with fossil fuel technologies in economic terms, they are not financially viable at the rates of return required by emerging market investors. Carbon finance is emerging as a powerful tool to improve the viability of clean technology investments. The sale of ER credits can generate sufficient cash flow to render certain classes of projects financially viable. Practical experience in undertaking projects demonstrates that carbon sales can provide a long-term stream of hard-currency revenues to projects that mitigate or sequester greenhouse gas emissions, particularly in the RE, EE, and waste-to-energy sectors. In most cases, these revenue streams strengthen the financial sustainability of underlying projects and help to expand the scale of RE operations. For these technologies, as well as most other classes of projects eligible under the Kyoto Protocol's Clean Development Mechanism (CDM) and Joint Implementation (JI), financial engineering of ERPA can help projects reach financial closure. In addition, carbon purchase contracts are increasingly being used as bankable instruments against which project sponsors are requesting financing.

Through the carbon finance business, the WBG is working to ensure that developing and transition economies get a sizable share of the carbon market under the Kyoto Protocol's CDM and JI with client countries providing high-quality carbon ERs in exchange for development dollars, technological know-how, and clean technologies for sustainable development.

Carbon finance operations are now an important part of the WBG's RE and EE portfolios, and they continue to expand. Carbon finance has acted as an important catalyst in developing projects and in promoting rural electrification, RE, and EE in various sectors, such as district heating and water supply, waste-to-energy, and sustainable forestry. These efforts have demonstrated the far-reaching potential of the carbon market by supporting projects that improve basic service delivery through private participation in infrastructure.

Carbon Finance business is a relatively new business for the WBG. It can be divided into separate business lines: the IBRD Carbon Finance and the IFC Carbon Finance.

IBRD Carbon Finance

As of June 2004, IBRD Carbon Finance had funds worth US\$415 million approved or under management. The World Bank's carbon finance products include the Prototype Carbon Fund, the Netherlands Clean Development Facility, the Community Development

Carbon Fund, the BioCarbon Fund, the Italian Carbon Fund, and the World Bank Staff Climate Protection Program.

There are sizeable differences between traditional WBG financing and participation in the carbon market. Since the purchase of emissions reductions is very different from the provision of project financing or investment, it is useful to note the differences: (a) it is a purchase of a project's output (that is, purchasing ERs, analogous to a power purchaser purchasing electricity) rather than a financing instrument; and (b) it is not the WBG's funds that are making the purchase, but rather the WBG is managing the use of funds from other sources (the ultimate buyers of the ERs). <http://www.carbonfinance.org>

IFC Carbon Finance

IFC has its own Carbon Finance unit that manages funds to purchase greenhouse gas ERs (or carbon credits) and is developing new products to help buyers and sellers mitigate risks in the emerging carbon market.

The facilities are arrangements under which IFC will purchase carbon credits for the benefit of the Government of the Netherlands under the international trading mechanisms of the Kyoto Protocol. IFC currently has about US\$85 million under management in two facilities to purchase credits: (a) the IFC Netherlands Carbon Facility operating under the rules of the CDM; and (b) the Netherlands European Carbon Facility operating under the rules of the JI mechanism and managed jointly with IBRD.

IFC manages these facilities and acts as an intermediary, bringing its experience and knowledge of evaluating and financing private sector projects in developing countries to structure contracts that minimize the risk associated with delivery of credits from projects. Other funds are under consideration in collaboration with the private sector.

The carbon contracts provide a periodic revenue stream to the project (for example, annually), with payments made upon delivery of the carbon credits. In addition, IFC *may* consider lending against this forward stream of revenues for projects that are also financed by IFC.

IFC is also developing financial products for the carbon market. These value added products will leverage IFC's ability to take long-term credit risk in emerging markets and will help unlock the financial value of carbon purchase agreements. IFC is currently evaluating opportunities to provide risk mitigation and guarantee products to buyers and sellers of carbon credits in collaboration with suitable private sector partners. <http://www.ifc.org/carbonfinance>

ESMAP

The Energy Sector Management Assistance Programme (ESMAP) is a global technical assistance program and knowledge partnership sponsored by a group of donors, including Canada, Denmark, Finland, Germany, the Netherlands, Norway, Sweden, the United Kingdom, the United Nations Foundation, the United Nations Development Programme (UNDP), and the World Bank. ESMAP is managed by the World Bank. ESMAP's support to RE and EE has been focusing on the following:

- Developing strategies, and improving RE policies and regulatory frameworks.

- Demonstrating innovative institutional and financing delivery mechanisms for RE.
- Developing strategies for modern biomass energy in the household sector.
- Improving EE in the industrial sector and water utilities.
- Developing energy-efficient and cost-effective urban heating strategies.
- Identifying innovative EE financing mechanisms.

Overall, ESMAP has played an important role in raising the profile of RE and EE and in mainstreaming them within the WBG and in client countries. ESMAP activities have demonstrated the close linkages between energy, the environment, and poverty reduction, and the contribution of energy services in meeting the Millennium Development Goals.

<http://www.worldbank.org/esmap>

ASTAE

In 1992, the World Bank and donor partners established the Asia Sustainable and Alternative Energy Program (ASTAE) to support the transition to environmentally sustainable energy use in developing countries in Asia. ASTAE supports both upstream Economic and Sector Work, much like ESMAP, but also provides assistance in RE and EE project identification, preparation, and supervision. ASTAE's strategic objective during the past decade has been to mainstream RE and EE into the World Bank's Asia region energy sector activities, with the aim of achieving a 10 percent share of RE and EE components in World Bank energy sector projects in Asia. This strategic objective has been achieved. By FY 2002 more than 19 percent of the Bank's energy sector lending in Asia was for alternative energy projects.

Looking forward, ASTAE will continue to support RE and EE projects in East Asia. Some of its objectives are as follows:

- Provision of improved energy services for an additional 1 million households.
- Installation of an additional 1 GW of renewable electricity-generating capacity.
- Avoidance of an additional 1 GW of conventional electricity-generating capacity through efficiency improvements.
- Reducing carbon emissions by more than 42.3 million tons CO₂ (measured during a 20-year period).

With regard to strategy, ASTAE will strengthen its support for developing a pipeline of World Bank and GEF RE and EE projects, which increase access to energy services and reduce greenhouse gas emissions. In the coming years the focus will be broadened to scale up cross-sectoral support in World Bank projects. <http://www.worldbank.org/astae/>

APTESI

Another important partnership is the Africa Poverty Targeted Energy Services Initiative (APTESI), which was established in 2004 and which merged the activities of two earlier programs dating back to 1993 and 1998, respectively. The earlier programs are the Regional Program for the Traditional Energy Sector and the Africa Rural and Renewable Energy Initiative. The aim of the former programs, as well as the current one, is to scale

up access to modern energy services and promote cross-sectoral activities to facilitate transformation of rural communities, businesses, and households, and to encourage greater use of RE, including biomass.

Definitions

Following are definitions for the energy terms used in this report.

New Renewable Energy

For the purposes of this report, projects that had at least one of the following were considered projects with a new RE component: geothermal energy; hydrogen and fuel cells; micro-, mini-, and small hydroelectric plants (less than 10 MW); PV; solar thermal energy; sustainable biomass fuel wood use; fuels produced from urban wastes; and wind.

Energy Efficiency

For the purposes of this report, projects that had at least one of the following were considered a project with an EE component: operations to improve the efficiency by which energy is produced, transformed, and used; production, transportation, and distribution of steam or hot water (heat) through an interconnected network (note that production may be conventional, thermal, or geothermal in origin); electrical EE improvements; and specialized entities providing EE services.

Hydropower

This includes hydropower projects where the installed capacity at a single facility exceeds 10 MW. Pumped storage, run-of-river hydropower, and hydropower projects with dams are included here as long as the capacity exceeds 10 MW.

The WBG supports projects that may be cross-sectoral in nature. For example, RE and EE components may be embedded within an agricultural, health, or power project. In the case of such blended projects, sometimes it is not easy to specify precisely what the size of each sectoral component is. In this report, as far as possible, great care has been taken to show only the commitment amount associated with new renewables, EE or hydropower (>10 MW). For example, in a particular project, the total commitment made by IBRD/IDA may be US\$100 million. This project may have three different sectoral components: agro-industry, 50 percent; health, 30 percent; and new renewables, 20 percent. In such a case, in this report only US\$20 million has been included as the project's contribution to RE.

Different Reporting Styles

The various World Bank institutions have differing styles of reporting their data because of their different kinds of business. For example, MIGA provides guarantees to projects against various kinds of risks, whereas IBRD and IDA provide project finance and guarantees. Emissions reductions purchases by carbon finance are a revenue stream. IFC provides both equity and loan financing, as well as guarantees. For the purposes of this report and to arrive at an estimate of the WBG's total commitments toward RE and EE, we have added commitments made by each WBG institution. The following distinctions should be kept in mind when reading this report.

IBRD/IDA

For IBRD/IDA–assisted projects, *commitment amounts* toward RE and/or EE for each project have been used to estimate the cumulative total for the WBG.

IFC

IFC annual reports show both the gross investment amount (which includes the amount of B loans syndicated by IFC from commercial banks for which IFC is the lender of record) and the IFC net investment amount side by side to illustrate the difference. For the purposes of arriving at a cumulative total for the WBG, this report uses the *original IFC gross commitment*.

The commitment amounts mentioned in this report are an underestimate of IFC’s actual investment commitments to all RE and EE activities because some types of such investments are not reported separately in the IFC’s current information systems or are difficult to identify as discrete components in larger IFC project investments or corporate loans. There is also no easy way to analyze the amount of indirect financing of RE/EE projects that occurs via IFC’s multibillion-dollar portfolio of capital market operations (that is, commercial bank and lease company financings, private equity funds, and so forth), except for those that specifically target RE or EE objectives.

GEF

For the approved GEF projects, this report uses the *commitment amounts* for each project. The total investment leveraged by GEF is difficult to gauge accurately. Typically it is two to five times the size of the GEF investment.

MIGA

MIGA normally reports the maximum liability of its guarantee and the FDI that the guarantee leveraged. For the purposes of arriving at a cumulative total for the WBG, this report added together the MIGA *maximum liability*.

Carbon Finance

For purposes of this annual report, in order to compare carbon asset purchases and regular project financing, this report considered *ERPAs signed* to be the appropriate measure and added those amounts to arrive at the total commitment, that is, the Carbon Finance business’ equivalent of Board approval for World Bank loans.

Annex 2: Annual Renewable Energy and Energy Efficiency Statistics

(All amounts in millions of U.S. dollars)

Annual Table 1: WBG Renewable Energy and Energy Efficiency Commitments

Type of commitment	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
New renewables	53	2	56	227	300	59	47	336	15	239	444	26	169	105	192	2,270
Energy efficiency		265	54	10	59	148	380	56	356	26	295	193	67	168	67	2,141
Hydropower (greater than 10 MW)		150	161	938	186	317	819	15	461		320		181	237	81	3,864
Grand total	53	417	271	1,174	545	524	1,245	407	832	264	1,059	219	416	510	339	8,275

Annual Table 2: WBG Renewable Energy and Energy Efficiency Commitments by Institution or Unit

Institution or unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
GEF–IBRD/IDA			3	36	56	35	10	78	28	56	111	14	37	70	83	617
GEF-IFC							37	33		30	5		19		14	137
IBRD Carbon Finance												2	8	10	48	68
IBRD/IDA	53	392	196	1,113	303	452	1,108	146	534	137	691	197	340	290	194	6,145
IFC		25	72	26	186	7	36	135	206	15	1	6	13	135		860
MIGA						30	35	15	65	26	252			5		428
Special Financing							20									20
Total commitment	53	417	271	1,174	545	524	1,245	407	832	264	1,059	219	416	510	339	8,275

Annual Table 3: WBG New Renewables Commitments by Institution or Unit

Institution or unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
GEF–IBRD/IDA			3	26	30	10	7	39	6	56	66	9	36	16	62	366
GEF-IFC							30	30		14					14	88
IBRD Carbon Finance												2	4	10	19	36
IBRD/IDA	53	2	20	201	270	19	8	132	10	128	127	9	128	64	97	1,266
IFC			33					135		15		6	1	15		204
MIGA						30	2			26	252					311
Total commitment	53	2	56	227	300	59	47	336	15	239	444	26	169	105	192	2,270

Annual Table 4: WBG Energy Efficiency Commitments by Institution or Unit

Institution or unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
GEF–IBRD/IDA				10	26	25	3	39	22	1	45	5	1	54	22	251
GEF-IFC							7	3		16	5		19			48
IBRD Carbon Finance															13	13
IBRD/IDA		265	54		33	123	350	14	328	9	244	188	35	34	32	1,710
IFC									6		1		12	75		93
MIGA														5		5
Special Financing							20									20
Total commitment		265	54	10	59	148	380	56	356	26	295	193	67	168	67	2,141

Annual Table 5: WBG Hydropower (>10 MW) Commitments by Institution or Unit

Institution or unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
IBRD Carbon Finance													4		15	19
IBRD/IDA		125	122	912		310	750		196		320		177	192	66	3,169
IFC		25	39	26	186	7	36		200					45		563
MIGA							33	15	65							113
Total commitment		150	161	938	186	317	819	15	461	—	320	—	181	237	81	3,864

Annual Table 6: WBG Renewable Energy and Energy Efficiency Commitments by Region

Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
Africa		127	73	203		3	12	30	201	7	124		78	32	46	935
East Asia and Pacific	51		121	410	310	367	400	145	123	139	513	8	124	177	47	2,933
Europe and Central Asia		290			33	140	381	14	238	15	68	186	75	139	147	1,726
Latin America and Caribbean	2		75	340	199	10	2	41	186	79	219	6	30	78	30	1,298
Middle East and North Africa					2	4									40	46
Global							32	148		25		12	1		13	231
South Asia			2	222			419	29	85		135	7	108	85	15	1,106
Grand total	53	417	271	1,174	545	524	1,245	407	832	264	1,059	219	416	510	339	8,275

Annual Table 7: WBG New Renewables Commitments by Region

Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
Africa		2	18	3		3	8	30	5	6	124		16	32	46	292
East Asia and Pacific	51				300	49		112	2	139		3	18		37	711
Europe and Central Asia							7		9	6	6	2		0	56	86
Latin America and Caribbean	2		37	2		3	2	20		78	204	6	26	35		415
Middle East and North Africa						4									40	44
Global							30	145		10		12	1		13	212
South Asia			2	222				29			110	2	108	38		510
Grand total	53	2	56	227	300	59	47	336	15	239	444	26	169	105	192	2,270

Annual Table 8: WBG Energy Efficiency Commitments by Region

Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
Africa							4		1	1						5
East Asia and Pacific			54	10	10	8		33	121		193	5	1	32	11	475
Europe and Central Asia		265			33	140	374	14	229	9	62	183	65	131	41	1,547
Latin America and Caribbean					14			6		1	15		0	6	15	57
Middle East and North Africa					2											2
Global							2	3		15						19
South Asia									6		25	5	1			37
Grand total		265	54	10	59	148	380	56	356	26	295	193	67	168	67	2,141

Annual Table 9: WBG Hydropower (>10 MW) Commitments by Region

Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Grand total
Africa		125	55	200					196				62			638
East Asia and Pacific			67	400		310	400				320		105	145		1,747
Europe and Central Asia		25											10	8	51	94
Latin America and Caribbean			39	338	186	7		15	186				4	37	15	826
South Asia							419		79					47	15	560
Grand total		150	161	938	186	317	819	15	461	—	320	—	181	237	81	3,864

Annex 3: List of Renewable Energy and Energy Efficiency Projects

(All amounts in US \$ millions)

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
						IFC (Gross)	IFC (Net)				
SOUTH ASIA REGION											
Afghanistan	FY04	Emergency Power Rehabilitation Project	Hydro	IBRD/IDA	15.00						> 10MW
Bangladesh	FY02	Rural Electrification & Renewable Energy Development	Solar PV	GEF	8.20						
Bangladesh	FY02	Rural Electrification Renewable Energy Development	Solar PV	IBRD/IDA	17.19						
India	FY93	Alternate Energy	Renewable	GEF	26.00						
India	FY93	Renewable Resources Development	Wind, Solar PV, Hydro	IBRD/IDA	190.00						< 10MW
India	FY98	Asian Electronics (ESCO) +	Efficiency	IFC		5.50	5.50	5.50			
India	FY00	Second Renewable Energy (Renewable Energy)	Hydro	IBRD/IDA	110.00						< 10MW
India	FY00	Second Renewable Energy (Energy Efficiency)	Efficiency	IBRD/IDA	20.00						
India	FY00	Energy Efficiency	Efficiency	GEF	5.00						
India	FY01	Rajasthan Power I (Renewable Energy)	Renewable	IBRD/IDA	1.80						
India	FY01	Rajasthan Power I (Energy Efficiency)	Efficiency	IBRD/IDA	5.40						
India	FY03	Balrampur Chini Mills*	Biomass / Biogas	IFC		15.20	15.20	15.20			
Nepal	FY93	Sunsari Morang Headworks	Hydro	IBRD/IDA	5.60						< 10MW
Nepal	FY96	Khimti Khola +	Hydro	IFC		36.00	31.00	26.80			> 10MW
Nepal	FY96	Himal Power Limited	Hydro	MIGA						32.80	> 10MW
Nepal	FY98	Bhote Koshi +	Hydro	IFC		79.00	27.00	23.30			> 10MW
Nepal	FY03	Power Development (Renewable)	Hydro	IBRD/IDA	22.68						< 10MW
Nepal	FY03	Power Development (Hydro > 10 MW)	Hydro	IBRD/IDA	46.87						> 10 MW
Pakistan	FY96	Ghazi Barotha Hydropower Project	Hydro	IBRD/IDA	350.00						> 10 MW
Sri Lanka	FY92	Power Distribution	Hydro	IBRD/IDA	1.50						< 10MW
Sri Lanka	FY96	Energy Services Delivery	Wind, Solar PV,	GEF	5.90						
Sri Lanka	FY97	Energy Services Delivery	Wind, Solar PV,	IBRD/IDA	23.23						< 10MW
Sri Lanka	FY02	Renewable Energy for Rural Economic Development (Renewable)	Wind, Solar PV, Biomass / Biogas, Hydro	GEF	8.00						
Sri Lanka	FY02	Renewable Energy for Rural Economic Development (Renewable)	Wind, Solar PV, Biomass / Biogas, Hydro	IBRD/IDA	74.25						
Sri Lanka	FY02	Renewable Energy for Rural Economic Development (Efficiency)	Efficiency	IBRD/IDA	0.75						< 10MW
MIDDLE EAST AND NORTH AFRICA REGION											
Egypt	FY04	Integrated Solar Thermal	Solar Thermal	GEF	40.20						
Iran	FY94	Teheran Transport Emissions Reduction	Efficiency	GEF	2.00						
Tunisia	FY95	Solar Water Heating	Solar Thermal	GEF	4.00						

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
LATIN AMERICA AND CARIBBEAN REGION											
Argentina	FY93	Yacyreta II	Hydro	IBRD/IDA	300.00						> 10MW
Argentina	FY96	New World Power	Hydro	MIGA						2.25	< 10MW
Argentina	FY99	Renewable Energy in Rural Markets	Solar PV	GEF	10.00						
Argentina	FY99	Renewable Energy in Rural Markets	Solar PV	IBRD/IDA	26.70						
Argentina	FY99	Argentina Efficient Street Lighting Program	Efficiency	IFC/GEF					0.74		
Belize	FY93	Becol +	Hydro	IFC		26.00	15.00	5.50			> 10MW
Bolivia	FY98	Cobee	Hydro	MIGA						62.50	> 10MW
Bolivia	FY03	Decentralized Infrastructure for Rural Transformation	Solar PV	IBRD/IDA	6.80						
Brazil	FY90	Itaparica Supplem	Renewable	IBRD/IDA	2.00						
Brazil	FY97	Rio Light	Hydro	MIGA						15.00	> 10MW
Brazil	FY98	Guilman Amorim +	Hydro	IFC		121.00	30.00	23.50			> 10MW
Brazil	FY00	Energy Efficiency	Efficiency	GEF	15.00						
Brazil	FY02	Energy Sector Reform Loan	Renewable	IBRD/IDA	22.73						
Brazil	FY03	PCF Minas Gerais Plantar	Biomass / Biogas	IBRD Carbon Finance	5.30						
Chile	FY92	Aconcagua +	Hydro	IFC		38.60	19.50	6.50			> 10MW
Chile	FY94	Panque +	Hydro	IFC		175.00	74.90	-			> 10MW
Chile	FY02	Chacabuquito Small Hydro	Hydro	IBRD Carbon Finance	4.06						> 10MW
Chile	FY04	Sustainable Transport and Air Quality for Santiago	Efficiency	GEF	6.98						
Colombia	FY03	Jepirachi Carbon Off Set	Wind	IBRD Carbon Finance	3.20						
Colombia	FY04	Amoya Environmental Services	Hydro	IBRD Carbon Finance	7.50						> 10MW
Costa Rica	FY94	Hidrozarcas +	Hydro	IFC		10.50	4.40	1.40			> 10MW
Costa Rica	FY95	Tejona Wind Power	Wind	GEF	3.30						
Costa Rica	FY98	Dona Julia	Hydro	MIGA						2.20	> 10MW
Costa Rica	FY99	Energia Global International Ltd. (EGI)+	Geothermal, Wind, Hydro	IFC		15.00	15.00	-			> 10MW
Costa Rica	FY03	Chorotega Wind Farm	Wind	IBRD Carbon Finance	0.92						
Costa Rica	FY03	Cote Small Hydro	Hydro	IBRD Carbon Finance	0.60						< 10MW

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
LATIN AMERICA AND CARIBBEAN REGION											
Ecuador	FY02	Power and Communications Sectors Modernization and Rural Services (PROMECC)	Renewable	GEF	2.84						
Ecuador	FY02	Power and Communications Sectors Modernization and Rural Services (PROMECC)	Efficiency	IBRD/IDA	0.46						
Guatemala	FY92	Orzunil +	Geothermal	IFC		33.00	18.00	15.60			
Guatemala	FY95	Fabrigas +	Hydro	IFC		7.00	7.00	1.40			> 10MW
Guatemala	FY97	Pantaleon*	Biomass / Biogas	IFC		20.00	20.00	3.80			
Guatemala	FY99	Orzunil I de Electricidad Limitada	Geothermal	MIGA						26.31	
Guatemala	FY03	El Canada +	Hydro	IFC		37.00	15.00	15.00			> 10MW
Guatemala	FY04	El Canada Small Hydro	Hydro	IBRD Carbon Finance	7.50						> 10MW
Honduras	FY92	Energy Sector	Biomass, Wind, Solar, Hydro	IBRD/IDA	3.54						
Honduras	FY93	Energy Sector Adj (REF2)	Renewable	IBRD/IDA	2.32						
Honduras	FY93	Morazan Dam Emergency	Hydro	IBRD/IDA	12.00						> 10MW
Jamaica	FY94	Demand Side Management Demonstration	Efficiency	GEF	3.80						
Mexico	FY94	High Efficiency Lighting	Efficiency	GEF	10.00						
Mexico	FY00	Renewable Energy for Agricultural Productivity (RETS)	Wind	GEF	8.90						
Mexico	FY00	Solar Thermal Integrated Cycle Project	Solar Thermal	GEF	49.35						
Mexico	FY01	Methane Gas Capture and Use and Landfill	Biomass / Biogas	GEF	6.27						
Mexico	FY03	Climate Friendly Measures in Transport	Efficiency	GEF	5.80						
Nicaragua	FY00	Ormat Momotombo Power Company	Geothermal	MIGA						144.72	
Nicaragua	FY03	Offgrid Rural Electrification	Solar Thermal	GEF	4.02						
Nicaragua	FY03	Offgrid Rural Electrification	Solar PV, Hydro	IBRD/IDA	8.88						< 10MW
Peru	FY04	Lima Urban Transport	Efficiency	GEF	7.93						
Regional	FY97	Planning for Adaption to Climate Change (CARICOM)	Environmental Assessment	GEF	6.30						
Regional	FY03	Mainstreaming Adaption to Climate Change (MACC)	Environmental Assessment	GEF	5.00						
Uruguay	FY00	Landfill Methane Recovery Demonstration Project	Biomass	GEF	0.98						

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
EUROPE AND CENTRAL ASIA REGION											
Belarus	FY01	Social Infrastructure Retrofitting	Efficiency	IBRD/IDA	21.24						
Bosnia-Herzegovina	FY96	Emergency District Heating Rehabilitation	Efficiency	Special Finc.	20.00						
Bosnia-Herzegovina	FY98	Emergency Natural Gas System Reconstruction	Efficiency	IBRD/IDA	0.30						
Bosnia-Herzegovina	FY99	Local Development Pilot	Efficiency	IBRD/IDA	4.20						
Bulgaria	FY03	District Heating	Efficiency	IBRD/IDA	34.20						
Bulgaria	FY04	Wood Residue to Energy	Biomass / Biogas	IBRD Carbon Finance	1.58						
Croatia	FY04	Energy Efficiency	Efficiency	GEF	7.00						
Croatia	FY04	Energy Efficiency	Efficiency	IBRD/IDA	5.00						
Czech Republic	FY99	Kyjev Waste Heat Utilization	Efficiency	GEF	5.80						
Czech Republic	FY03	City of Most Lighting	Efficiency	MIGA						4.90	
Czech Republic	FY04	PCF Umbrella	Wind, Biomass / Biogas, Hydro, Efficiency	IBRD Carbon Finance	2.31						< 10MW
Czech Republic	FY04	PCF Umbrella	Efficiency	IBRD Carbon Finance	2.38						
Estonia	FY94	District Heat Rehabilitation	Efficiency	IBRD/IDA	33.02						
Georgia	FY95	Municipal Infrastructure Rehabilitation	Efficiency	IBRD/IDA	4.68						
Hungary	FY97	Hungary Energy Efficiency Co-Financing (HEECP)	Efficiency	IFC/GEF					5.00		
Hungary	FY02	Hungary Energy Efficiency Co-Financing (HEECP2) **, 1	Efficiency	IFC/GEF		12.00	12.00	12.00	0.70		
Hungary	FY03	Rehabilitation and Expansion of Small Hydro-Plants on the River Raba Project	Hydro, Efficiency	GEF	0.42						< 10MW
Hungary	FY04	Pannonpower Biomass (PCF)	Biomass / Biogas	IBRD Carbon Finance	0.43						
Hungary	FY04	Pannonpower Biomass (PCF)	Efficiency	IBRD Carbon Finance	-						
Kyrgyz Republic	FY96	Power and District Heating Rehabilitation	Efficiency	IBRD/IDA	19.60						
Kyrgyz Republic	FY98	Power and District Heating Supplemental	Efficiency	IBRD/IDA	14.70						

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
EUROPE AND CENTRAL ASIA REGION											
Latvia	FY95	Jelgava District Heating Rehabilitation	Efficiency	IBRD/IDA	14.00						
Latvia	FY98	Solid Waste Management and Landfill Gas Recovery	Biomass / Biogas	GEF	5.12						
Latvia	FY98	Solid Waste Management	Biomass / Biogas	IBRD/IDA	3.74						
Latvia	FY01	Liepaja Solid Waste Management	Waste to Energy	IBRD Carbon Finance	2.48						
Latvia	FY01	Riga District Heating	Efficiency	IBRD/IDA	36.16						
Lithuania	FY96	Klaipeda Geothermal	Renewable	GEF	6.90						
Lithuania	FY96	Klaipeda Geothermal	Efficiency	IBRD/IDA	5.90						
Lithuania	FY97	Energy Efficiency/Housing Pilot	Efficiency	IBRD/IDA	9.80						
Lithuania	FY99	Municipal Development	Efficiency	IBRD/IDA	5.03						
Lithuania	FY02	Vilnius District Heating	Efficiency	IBRD/IDA	17.10						
Lithuania	FY02	Education Improvement	Efficiency	IBRD/IDA	17.01						
Lithuania	FY03	Heat Demand Management (formerly Vilnius District Heating)	Efficiency	GEF	6.50						
Macedonia, FYR	FY00	Mini-Hydropower	Hydro	GEF	0.75						< 10MW
Moldova	FY04	Energy 2	Efficiency	IBRD/IDA	3.50						
Moldova	FY04	SIF 2	Efficiency	IBRD/IDA	3.00						
Poland	FY91	Heat Supply Restructuring & Conservation	Efficiency	IBRD/IDA	265.20						
Poland	FY95	Coal to Gas Conversion	Efficiency	GEF	25.00						
Poland	FY95	Katowice Heat Supply	Efficiency	IBRD/IDA	45.00						
Poland	FY98	Flood Emergency	Efficiency	IBRD/IDA	14.00						
Poland	FY00	Podhale Geothermal District Heating and Environment	Geothermal	GEF	5.40						
Poland	FY00	Podhale Geothermal District Heating and Environment	Efficiency	IBRD/IDA	38.20						
Poland	FY00	Poland Efficient Lighting (PELP)*	Efficiency	IFC/GEF					5.00		
Poland	FY01	Krakow Energy Efficiency	Efficiency	IBRD/IDA	15.00						
Regional	FY00	Honeywell ESCO: ESCO Polska/ESCO Hungary +	Efficiency	IFC		0.60	0.60	0.60			
Regional	FY03	Commercializing Energy Efficiency Finance (CEEFF) **, 1	Efficiency	IFC/GEF		75.00	75.00	75.00	18.00		
Romania	FY03	Energy Efficiency Project	Efficiency	GEF	10.00						
Russian Federation	FY95	Energy Efficiency	Efficiency	IBRD/IDA	51.12						
Russian Federation	FY96	Enterprise Housing Divestiture	Efficiency	IBRD/IDA	300.00						
Russian Federation	FY96	Greenhouse Gas Reduction	Efficiency	GEF	3.20						
Russian Federation	FY97	St. Petersburg Center City Rehabilitation	Efficiency	IBRD/IDA	4.34						
Russian Federation	FY01	Municipal Heating	Efficiency	IBRD/IDA	82.45						
Russian Federation	FY04	Developing the Legal and the Regulatory Framework for Wind Power	Wind	IFC/GEF					0.73		
Serbia and Montenegro	FY04	Energy Efficiency	Efficiency	IBRD/IDA	21.00						
Slovenia	FY96	Environment	Efficiency	IBRD/IDA	20.79						
Tajikistan	FY02	Pamir Private Power	Hydro	IBRD/IDA	10.00						> 10MW
Tajikistan	FY03	Pamir +	Hydro	IFC		8.00	8.00	8.00			> 10MW
Turkey	FY91	Kepez Elektrik +	Hydro	IFC		25.00	25.00	6.50			> 10MW
Turkey	FY04	Renewable Energy	Hydro	IBRD/IDA	50.51						< 10MW
Turkey	FY04	Renewable Energy	Hydro	IBRD/IDA	50.51						> 10 MW
Ukraine	FY98	Kiev District Heating Improvement	Efficiency	IBRD/IDA	200.00						
Ukraine	FY00	Kiev Public Buildings Energy Efficiency	Efficiency	IBRD/IDA	18.29						
Ukraine	FY01	Sevastapol Heat Supply Improvement	Efficiency	IBRD/IDA	28.20						

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

					IBRD/IDA and/or GEF Commitments	IFC Commitments					
Country	Approved in fiscal year	Project Name	Energy Type	Financing	Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)	IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
EAST ASIA AND THE PACIFIC REGION											
Cambodia	FY04	Rural Electrification and Transmission	Renewable	GEF	5.75						
Cambodia	FY04	Rural Electrification and Transmission	Solar Thermal, Hydro	IBRD/IDA	3.20						< 10MW
China	FY92	Beijing Environmental	Efficiency	IBRD/IDA	53.75						
China	FY92	Daguangba Hainan	Hydro	IBRD/IDA	67.00						> 10MW
China	FY93	Shuikou II	Hydro	IBRD/IDA	100.00						> 10MW
China	FY93	Tianhuangping Hydroelectric Project	Hydro	IBRD/IDA	300.00						> 10MW
China	FY94	Sichuan Gas Transmission and Distribution	Efficiency	GEF	10.00						
China	FY95	Liaoning Environment	Efficiency	IBRD/IDA	7.70						
China	FY95	Yangtze Basin Water Resources	Hydro	IBRD/IDA	210.00						> 10MW
China	FY96	Ertan II Hydroelectric Project	Hydro	IBRD/IDA	400.00						> 10MW
China	FY97	Efficient Industrial Boilers	Efficiency	GEF	32.80						
China	FY98	Energy Conservation	Efficiency	GEF	22.00						
China	FY98	Energy Conservation	Efficiency	IBRD/IDA	57.96						
China	FY98	Shandong Environment	Efficiency	IBRD/IDA	40.85						
China	FY99	Renewable Energy Development	Wind, Solar PV	GEF	35.00						
China	FY99	Renewable Energy Development	Wind, Solar PV	IBRD/IDA	100.00						
China	FY00	Beijing Environment II	Efficiency	GEF	25.00						
China	FY00	Beijing Environment II	Efficiency	IBRD/IDA	167.52						
China	FY00	Tongbai Pumped Storage	Hydro	IBRD/IDA	320.00						> 10MW
China	FY02	Passive Solar Rural Health Clinics	Solar	GEF	0.75						
China	FY02	Hubei Hydropower Dev in Poor Areas	Hydro	IBRD/IDA	105.00						> 10MW
China	FY03	Energy Conservation, Phase II	Efficiency	GEF	26.00						
China	FY03	Yixing Pumped Storage Project	Hydro	IBRD/IDA	145.00						> 10MW
China	FY04	Fourth Inland Waterways	Hydro	IBRD/IDA	13.65						< 10MW

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
EAST ASIA AND THE PACIFIC REGION											
Indonesia	FY95	Second Rural Electrification Project	Geothermal, Hydro	IBRD/IDA	19.40						< 10MW
Indonesia	FY97	Renewable Energy Small Power	Biomass / Biogas, Hydro,	GEF	4.00						< 10MW
Indonesia	FY97	Renewable Energy Small Power	Biomass / Biogas, Hydro,	IBRD/IDA	63.74						< 10MW
Indonesia	FY97	Solar Home Systems	Solar PV	GEF	24.30						
Indonesia	FY97	Solar Home Systems	Solar PV	IBRD/IDA	20.00						
Indonesia	FY01	Western Java Environmental Management	Environmental Assessment	GEF	3.11						
Indonesia	FY04	Indocement Sustainable Cement Production	Efficiency	IBRD Carbon Finance	10.80						
Lao, PDR	FY98	Southern Provinces Rural Electrification	Solar PV	GEF	0.74						
Lao, PDR	FY98	Southern Provinces Rural Electrification	Solar PV	IBRD/IDA	1.04						
Mongolia	FY01	Stove Improvement	Efficiency	GEF	0.75						
Philippines	FY90	Energy Sector Loan	Geothermal	IBRD/IDA	50.70						
Philippines	FY94	Leyte Luzon Geothermal - PNOC - NPC	Geothermal	IBRD/IDA	213.38						
Philippines	FY94	Leyte Luzon Geothermal - PNOC - NPC	Geothermal	GEF	30.00						
Philippines	FY94	Leyte Cebu Geothermal- PNOC - NPC	Geothermal	IBRD/IDA	56.97						
Philippines	FY95	Magma Leyte	Geothermal	MIGA						30.00	
Philippines	FY99	CEPALCO Solar Photovoltaic Demonstration	Solar PV	IFC/GEF				4.00			
Philippines	FY01	Metro Manila Urban Transport	Efficiency	GEF	1.30						
Philippines	FY04	Rural Power (Renewable Energy Component)	Renewable	GEF	9.00						
Philippines	FY04	Rural Power Project	Solar PV, Hydro	IBRD/IDA	5.00						< 10MW
Thailand	FY93	Promotion of Electricity Energy Efficiency	Efficiency	GEF	9.50						
Thailand	FY95	Lam Takhong Pump Storage	Hydro	IBRD/IDA	100.00						> 10MW
Thailand	FY01	Building Chiller Replacement Program	Efficiency	GEF	2.50						
Vietnam	FY02	System Efficiency Improvement, Equitization & Renewables SEIER	Hydro	GEF	4.50						
Vietnam	FY02	System Efficiency Improvement, Equitization & Renewables SEIER	Hydro	IBRD/IDA	13.50						< 10MW
Vietnam	FY03	Demand-Side Management & Energy Efficiency Component of SEIER	Efficiency	GEF	5.50						

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
AFRICA REGION											
Burundi	FY91	Energy Sector Rehabilitation	Biomass / Biogas, Hydro	IBRD/IDA	1.60						< 10MW
Cape Verde	FY99	Energy/Water Sector Reform	Wind, Solar PV	GEF	4.70						
Cape Verde	FY99	Energy/Water Sector Reform	Wind, Solar PV	IBRD/IDA	1.23						
Chad	FY98	Household Energy (Renewable Component)	Biomass / Biogas, Efficiency	IBRD/IDA	0.85						
Chad	FY98	Household Energy (Efficiency Component)	Efficiency	IBRD/IDA	0.53						
Cote d'ivoire	FY99	Energy Efficiency Service Market	Efficiency	GEF	0.73						
Ethiopia	FY98	Energy II (New Renewables Component)	Biomass / Biogas, Hydro	IBRD/IDA	4.00						< 10MW
Ethiopia	FY98	Energy II (Hydro > 10 MW)	Hydro	IBRD/IDA	196.00						> 10MW
Ethiopia	FY03	Energy Access	Solar PV	GEF	4.93						
Ethiopia	FY03	Energy Access	Solar PV, Sustainable Biomass	IBRD/IDA	21.71						
Guinea	FY03	Rural Energy	Renewable	GEF	2.00						
Guinea	FY03	Decentralized Rural Electrification	Solar PV, Hydro	IBRD/IDA	3.50						< 10MW
Kenya	FY97	Energy Sector Reform	Geothermal	IBRD/IDA	20.00						
Kenya	FY00	Olkaria III Phase 1	Geothermal	MIGA						107.49	
Kenya	FY02	Olkaria III Phase 2	Geothermal	MIGA							
Madagascar	FY96	Energy Sector Development	Biomass / Biogas, Hydro, Efficiency	IBRD/IDA	7.82						< 10MW
Madagascar	FY96	Energy Sector Development	Efficiency	IBRD/IDA	3.68						
Madagascar	FY04	Environment Program III	Sustainable Biomass	IBRD/IDA	4.00						
Malawi	FY92	MW Power V	Hydro	IBRD/IDA	55.00						> 10MW
Mali	FY95	Household Energy	Renewable	GEF	2.50						
Mali	FY04	Household Energy and Universal Rural Access (Phase II)	Renewable	GEF	3.50						
Mali	FY04	Household Energy and Universal Access	Wind, Solar PV, , Biomass / Biogas, Hydro	IBRD/IDA	17.83						< 10MW
Mauritius	FY92	Sugar Bio-Energy Technology	Biomass/Biogas	GEF	3.30						
Mauritius	FY92	Sugar Energy Development	Biomass / Biogas, Hydro	IBRD/IDA	15.00						< 10MW
Mozambique	FY04	Energy Reform and Access	Solar PV, Hydro	GEF	3.09						
Mozambique	FY04	Energy Reform and Access	Solar PV, Hydro	IBRD/IDA	2.82						< 10MW
Rwanda	FY93	Rwanda Energy Sector Rehabilitation	Solar Thermal, Hydro	IBRD/IDA	2.60						< 10MW
Senegal	FY97	Sustainable and Participatory Energy Management	Environmental Assessment	GEF	4.70						
Senegal	FY98	Sustainable and Participatory Energy Management	Sustainable Biomass	IBRD/IDA	5.20						
South Africa	FY00	Concentrating Solar Power for Africa (ESKOM)	Solar	GEF	0.23						
South Africa	FY04	Durban Municipal Solid Waste	Waste to energy	IBRD Carbon Finance	15.01						
Tanzania	FY93	Power VI	Hydro	IBRD/IDA	200.00						> 10MW
Uganda	FY91	Power III	Hydro	IBRD/IDA	125.00						> 10MW
Uganda	FY00	Power III Supplemental	Hydro	IBRD/IDA	16.50						< 10MW
Uganda	FY02	Fourth Power Project	Hydro	IBRD/IDA	62.00						> 10MW
Uganda	FY02	Energy for Rural Transformation	Renewable	GEF	12.10						
Uganda	FY02	Energy for Rural Transformation	Hydro	IBRD Carbon Finance	3.90						< 10MW

WBG Progress on Renewable Energy and Energy Efficiency: 1990–2004

Country	Approved in fiscal year	Project Name	Energy Type	Financing	IBRD/IDA and/or GEF Commitments	IFC Commitments		IFC Current Amount Outstanding	GEF Amount (for IFC/GEF projects)	MIGA Max. Liability	Hydro projects less than or greater than 10MW
					Renewable energy or energy efficiency component	IFC (Gross)	IFC (Net)				
GLOBAL PROJECTS											
Global	FY96	Small and Medium Scale Enterprise Program (SME1)	Solar PV, renewables, efficiency	IFC/GEF					1.50		
Global	FY97	Renewable Energy & Energy Efficiency Fund (REEF) + ²	Biomass / Biogas	IFC/GEF		115.00	35.00	-	30.00		
Global	FY97	Small and Medium Scale Enterprise Program Replenishment (SME2)	Solar PV, efficiency	IFC/GEF					6.05		
Global	FY98	Photovoltaic Market Transformation Initiative (PVMTI)	Solar PV	IFC/GEF					30.00		
Global	FY99	Efficient Lighting Initiative (ELI) - Tranche I	Efficiency	IFC/GEF					9.35		
Global	FY01	Solar Development Group (SDG): Solar Development Capital (SDC) ³	Solar PV	IFC/GEF		5.50	5.50	-	10.00		
Global	FY01	Solar Development Group (SDG): Solar Development Foundation (SDF) ⁴ + ^{4,5}	Solar PV	IFC/GEF	6.91	0.50	0.50				
Global	FY01	Efficient Lighting Initiative (ELI) - Tranche II	Efficiency	IFC/GEF					5.65		
Global	FY02	Renewable Energy Sustainable Livelihood Projects for Youth	Renewable	GEF	0.80						
Global	FY03	Phase 1 & Phase 2	Fuel Cells	IFC/GEF					9.80		
<p>+ IFC Investments in Infrastructure Department</p> <p>* IFC investments in agribusiness department</p> <p>** IFC Investments in Financial Markets Department</p> <p>¹ These amounts represent the total volume of IFC guarantees made available for use by financial intermediaries. The actual volume of transactions supported depends on market uptake.</p> <p>² Cancelled during FY03 with only one biomass sub-project disbursement made.</p> <p>³ Solar Development Group was a combined WBG initiative with two components, a for-profit private equity fund called Solar Development Capital (SDC) and a not-for-profit entity called Solar Development Foundation (SDF). SDC was cancelled in FY04 with only 3 sub-project disbursements made.</p> <p>⁴ Solar Development Group was a combined WBG initiative with two components, a for-profit private equity fund called Solar Development Capital (SDC) and a not-for-profit entity called Solar Development Foundation (SDF). In March 2004 the activities of Solar Development Foundation were transferred to the Triodos Renewable Energy for Development Fund.</p> <p>⁵ IBRD funding commitment was a Development Grant Facility (DGF) grant to SDF.</p> <p>Note: There are likely additional IFC investments which have supported renewable energy utilization by agribusiness and forest product firms that have not been separately accounted for as they are smaller components of larger financing packages. There is also likely to be additional indirect financing of RE projects through financial intermediaries receiving IFC financing.</p> <p>EE investments do not include many other types of IFC investments which produce EE benefits (i.e. supply-side efficiency, mass transit, fossil fuel-based cogeneration, and EE equipment manufacture).</p>											