ANNUAL ENERGY SECTOR MISSION

to the World Bank Group, Inter-American Development Bank, Asian Development Bank & African Development Bank

Including a program with United States government energy authorities, Millennium Challenge Corporation and UN

"Access to Energy for the World: Green Solutions to Global Challenges"

Washington, D.C., October 31 – November 5, 2010

FINAL AGENDA

Sunday, October 31st	**Welcome Gathering for Mission at Fairmont Hotel - 2401 M Street, NW, Washington D.C.**
5:00 – 8:00 PM	Welcoming Remarks, Presentation of participants and Introduction to the World Bank Group **by *Gilles Garcia, Manager, Enterprise Outreach Services, Vice-Presidency for External Affairs, The World Bank– Room: Ballroom I*** Networking Dinner – ***Room: Roosevelt***
Monday, November 1st	**Program at the World Bank, MC Building - *Room MC2-800*, 1818 H Street NW, Washington D.C.**
8:30 – 9:00 AM	Registration
09:00 - 9:45 AM	World Bank Group priorities, programs and projects in the Energy sector: ***Lucio Monari, Energy Sector Manager, World Bank***
09:45 – 10:30 AM	IFC's Role in Supporting Energy Investments in client countries: ***Shinji Yamamoto, Chief Investment Officer, Power Global Infrastructures, IFC*** ***Dana Younger, Senior Renewable Energy Adviser, IFC*** ***Corinne Figueredo, Senior Investment Officer, IFC***
10:30 – 10:45 AM	Coffee Break
10:45 – 11:30 AM	Climate Investment Funds and other Energy/Climate change funds: ***Joumana Asso, Senior Private Sector Development Specialist, World Bank***
11:30 – 12:30 PM	Addressing the Energy Access Gap: ***Koffi Ekouevi, Senior Economist, Sustainable Energy Department, World Bank***
12:45 – 2:30 PM	Working Lunch at the World Bank with Bank Staff and Keynote Speaker: ***Jonathan Walters, Regional Strategy and Programs Director, Middle East and North Africa Region, World Bank***
2.45 – 3.45 PM	World Bank Renewable Energy program and projects: Solar: ***Natalia Kulichenko-Lotz, Senior Energy Specialist, World Bank*** Wind: ***Chandrasekar Govindarajalu, Senior Energy Specialist, World Bank*** Hydro: ***Daryl Fields, Senior Water Resources Specialist and*** ***Oeyvind Espeseth Lier, Senior Hydropower Specialist***
3.45 - 4.00 PM	Coffee Break
4.00– 5.00 PM	World Bank Energy Efficiency Program and Projects: ***Ashok Sarkar, Senior Energy Specialist, Energy Anchor, World Bank***

Tuesday, November 2nd	**Program at the World Bank (continued), MC Building – *Room MC2-800*, 1818 H Street NW, Washington D.C.**
09:00-11:00 AM	Regional overview of Energy projects with a sector focus: AFRICA/HYDRO: ***Fanny Kathinka Missfeldt-Ringius, Senior Energy Economist, Africa Region*** EAST ASIA/GEOTHERMAL ***Vijay Njagganathan, Sector Manager Energy, World Bank*** ECA/NATURAL GAZ ***Franz Gerner, Senior Energy Economist, World Bank*** LAC/WIND ***Philippe Charles Benoit, Sector Manager Energy, World Bank***
11.00 - 11.15 AM	Coffee Break
11.15- 12.30 PM	MIGA: Political Risk Mitigation for Energy Access Projects ***James Bond, Chief Operating officer, MIGA*** ***Antonio Barbalho, Energy Sector Leader, MIGA***
1:00 – 3:00 PM	Lunch Program: US Energy Policy Briefing at **K&L Gates** ***1601 K Street, NW (16th & K Streets) - Conference Room 1A,*** **Washington, DC 20006** Presentations by: ***James T. Walsh, Government Affairs Counselor, K&L Gates LLP*** ***Office of Renewable Energy and Energy Efficiency, US Department of Energy (Speaker TBC)*** ***Craig O'Connor, Director, Office of Renewable Energy and Environmental Exports, Export-Import Bank of the United States***
3:00– 5:00 PM	One-on-One meetings with World Bank Task Team Leaders (TTL) to discuss specific projects of interest to companies or IDB staff per company's request
5:30 – 8:00 PM	Dinner Program with the **Asian Development Bank,** via a video conference with ADB Headquarters in Manila, Philippines, **MC Building –** ***Gallery Dining Room,*** **1818 H Street NW, Washington D.C.** Presentations by: ***Christopher W. MacCormac, Resident Director General, North American Representative Office, Asian Development Bank*** ***Katherine Ferrey, Resident Relations Officer, Asian Development Bank*** ***Anil Terway, Senior Advisor and Practice Leader for Energy, Asian Development Bank***
Wednesday, November 3rd	**Program at the Inter-American Development Bank - *Conference Room Andres Bello 1/2, 9th floor* - 1300 New York Avenue, NW Washington, D.C.**
8:15 – 9:00 AM	Registration for IDB Program
9:00 – 9:15 AM	Welcoming Remarks ***Steven J. Puig, Vice-President for Private Sector Operations TBC***
9:15 – 10:15 AM	The IDB Perspective on Regional Trends and Challenges in the Development of Sustainable Energy and the Role of the Private Sector Moderator: ***Helga Flores, Office of External Relations***

	The Latin American and Caribbean Context for Developing Green Energy Solutions: LAC Energy Matrices, Regulation and Demand for Energy ***Leandro Alves, Energy Division***
	Promoting Private Opportunity for the Public Good: The Business Case for Cleaner Energy ***Steven Wilson, Vice Presidency for Private Sector Operations***
	Clean Technologies in Latin America: Challenges and Opportunities ***Carla Tully, the AES Corporation***
10:15 -10:30 AM	Doing Business with the IDB: Introduction ***Vanessa Defournier, Office of External Relations***
10:30 – 11:30 AM	Opportunities for Contractors and Consultants through IDB-Financed Projects
	How to Look for Procurement and Consultancy Opportunities ***Omar Wahab, Office of External Relations***
	The IDP Pipeline for Sustainable Energy Projects ***Gastón Astesiano, Energy Division TBC***
11:30 – 11:45 AM	Coffee Break
11:45 - 1:00 PM	Financial and Non-Financial Products for the Promotion of Sustainable Energy
	The Private Sector Windows of the Bank ***Nathaniel Jackson or Lori Kerr, Vice Presidency for Private Sector Operations*** ***Gregory Watson, Multilateral Investment Fund*** ***Angela Miller, Inter-American Investment Corporation***
	Structured and Corporate Finance Department Speaker TBC
1:00 – 2:00 PM	Working Lunch
2:00 – 2:45 PM	Moderator: ***Susana Cardenas, Sustainable Energy and Climate Change Unit***
	The Clean Technology Fund Experience ***Claudio Alatorre, Sustainable Energy and Climate Change Unit***
	Strategic Thematic Funds ***Laura Gaensly, Sustainable Energy and Climate Change Unit***
	SECCI Funds ***Gloria Visconti, Sustainable Energy and Climate Change Unit***
	GEF Funds ***Ricardo Quiroga, Environment, Rural Development, Disaster Risk Management Division TBC***
2:45 – 3:30 PM	Carbon Finance Opportunities for the Private Sector
	Moderator: ***Maya Hennerkes, Office of External Relations***
	The IDB's Work Program on Carbon Finance ***Michael Rattinger, Sustainable Energy and Climate Change Unit***
	The Microcarbon Fund ***Gregory Watson, Multilateral Investment Fund***

3:30 – 4:45 PM	Interactive Sectoral Panels Parallel Tracks <u>a. The Landscape for Energy Efficiency Projects in the Region</u> Moderator: ***Helga Flores, Office of External Affairs*** Promotion of Energy Efficiency: Challenges and Opportunities ***Christoph Tagwerker, Sustainable Energy and Climate Change Unit*** The Market for Efficient Lighting in Latin America ***Paul Constance, Office of External Relations*** The Energy Efficiency Guarantee Mechanism in Brazil ***Alejandra Duran, Structured and Corporate Finance Department*** GREENPYME: an IIC initiative to mitigate climate change, support and promote energy efficiency, renewable energy, and clean technologies among SMEs in Latin America and the Caribbean ***Jorge Roldan, IIC*** <u>b. The Potential for Renewable Energy</u> Moderator: ***Vanessa Defournier, Office of External Affairs*** Countries Pioneering the Development of Renewables in the Region ***Juan Roberto Paredes, Energy Division*** The Potential for Wind Power Projects ***Ramón Fiestas, Global Wind Energy Council*** The potential for Geothermal Prospects in LAC ***Elizabeth Robberechts, Structured and Corporate Finance Department TBC*** Eurus: IDB-Financed Wind Power ***Rachel Robboy, Structured and Corporate Finance Department TBC*** IDB Biogas Projects ***Zachary Levey, Multilateral Investment Fund*** ***Wesly Urena, Sustainable Energy and Climate Change Unit*** Regional Development of Biofuels ***Arnaldo Vieira, Energy Division*** ***Gloria Visconti, Sustainable Energy and Climate Change Unit***
4:45 – 5:00 PM	Closing Remarks
5:00 – 6:00 PM	Networking Cocktail

Thursday, November 4th

9:00 am – 4:00 PM	One-on-One meetings with World Bank Task Team Leaders (TTL) to discuss specific projects of interest to companies or IDB staff per company's request **OR**
8:00 –9:30 AM	Morning Program with the **African Development Bank, MC Building –** ***Room MC10-100,*** **1818 H Street, Washington DC** ***Richard Claudet, Chief Investment Officer, Private Sector, AfDB*** ***Mafalda Duarte. Principal Climate Change Specialist., AfDB*** ***Emmanuel Nzabanita, Chief Power Engineer, AfDB***

10:00 – 11:30 AM	Overview of energy projects funded by **Millennium Challenge Corporation,** ***Room MC10-100,*** **1818 H Street, Washington DC** ***Matt Harsha-Strong, Manager for Private Sector Initiatives*** ***Jonathan Saiger, Senior Director for Infrastructure*** ***Mike McEntire, Senior Director for Procurement***
12:00– 5:00 PM	One-on-One meetings with World Bank Task Team Leaders (TTL) to discuss specific projects of interest to companies or IDB staff per company's request
Friday, November 5th	**OPTIONAL PROGRAM with the United Nations in New York, NY, BCPR Conference Room, 20th floor, UNDP Building – DC1, 1 UN Plaza, 44th Street/1st Avenue, New York, NY**
9:00 - 9:15 AM	Welcoming Remarks ***Mr. Jacob Willemsen, New Amsterdam Trade & Consultancy***
9:15 - 10:00 AM	Overview of the UN System UN Procurement Division UN Global Marketplace ***Monica Kaushal, Procurement Officer, UN Procurement Division***
10:00 - 10:30 AM	***Tariq Banuri, Director, Division for Sustainable Development, United Nations Department of Economic and Social Affairs (DESA)***
10:30 - 10:45 AM	Coffee Break (15 min)
10:45 - 11:30 AM	UN Development Program (UNDP) Energy and Environment Group / Global Environment Facility (GEF) ***Marcel Alers, Principal Technical Advisor Climate Change Mitigation, Manager MDG Carbon Facility, UNDP***
11:30 - 12:00 PM.	***Salman Haq, Legal Officer, Office of the Regional Director, North America Office (NAO), United Nations Office for Project Services (UNOPS)***
12:00 - 12:30 PM	Lunch Break (30 min)
12:30 - 1:15 PM	UN Global Compact ***Georg Kell, Executive Director of the UN Global Compact***
1:15 - 2:00 PM	The Business Call to Action and the Millennium Development Goals ***Natalie Africa, Program Manager, Business Call to Action Secretariat*** ***Jonathan Andrews, Chief of Staff, Bureau for Crisis Prevention and Recovery. UNDP*** ***Mohamed Yahya, Project Manager of Natural Resources and Conflict Prevention at UN Interagency for Preventive Action***
2:00 - 2:45 PM .	Practical Aspects of Doing Business with the UN ***Jacob Willemsen, New Amsterdam Trade & Consultancy***
2:45 - 3:00 PM	Conclusion from the PSLO Network

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SPEAKER BIOGRAPHIES

– THE WORLD BANK GROUP –

JOUMANA ASSO, SENIOR PRIVATE SECTOR DEVELOPMENT SPECIALIST, CLIMATE INVESTMENT FUNDS, WORLD BANK

Joumana Asso is Senior Private Sector Development Specialist at the Climate Investment Funds (CIF) at the World Bank. She is responsible for two large mandates, supporting the activities of the Clean Technology Fund and ensuring fast deployment of resources through the Multilateral Development Banks, and cross support of the private sector portfolio and agenda within the CIF's four funds in the area of clean technology in middle income countries, and forestry, climate resilience and renewable energy in low income countries. Her work involves significant engagement and outreach to technology providers, financial institutions and real sector companies in developed and developing countries to ensure partnerships and synergies are leveraged. Prior to joining the Climate Investment Funds, Ms Asso worked for the International Finance Corporation (IFC), the private sector arm of the World Bank Group since 1999. As an investment professional, her work included project finance and venture capital investing in the manufacturing and the cleantech sectors with transactions executed in India, China, the Balkans, and the Middle East and North Africa, in addition to extensive advisory work in the cleaner production and energy efficiency area.

ANTONIO BARBALHO, HEAD OF UNDERWRITING, OIL, GAS, MINING, CHEMICAL AND ENERGY SECTORS, MULTILATERAL INVESTMENT GUARANTEE AGENCY

Antonio Barbalho is head of underwriting for the oil, gas, mining, chemical, and energy sectors of The World Bank's Multilateral Investment Guarantee Agency. Throughout his career, Mr. Barbalho has advised international oil and gas companies on project development, project finance, mergers and acquisitions, risk management, and trading. He held senior positions in the energy, utilities, and financial sectors, including at Deutsche Bank and CERA. Prior to joining Deutsche Bank, he was a director at Eletrobras Group with responsibilities in energy planning and NE Brazil energy savings program. Mr. Barbalho earned a bachelor's degree in Electrical Engineering from the Federal University, Brazil and a doctorate of Philosophy from Strathclyde University in the United Kingdom.

JAMES BOND, CHIEF OPERATING OFFICER, MULTILATERAL INVESTMENT GUARANTEE AGENCY

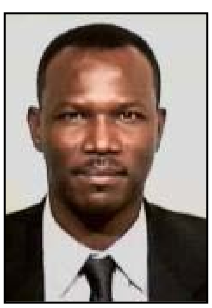
James Bond is the Chief Operating Officer of the Multilateral Investment Guarantee Agency (MIGA), a member of the World Bank Group, which provides political risk insurance. Prior to his appointment in MIGA, James held numerous managerial positions at the World Bank Group. From 1986-2007, he served as Country Director for operations in sub-Saharan Africa (Benin, Côte d'Ivoire, Mali, Mauritania, and Togo, as well as Madagascar, Comoros, Mauritius and Seychelles); Director of Environmental and Socially Sustainable Development for Africa; IFC Director of Mining; Director of Energy, Mining and Telecommunications; and

Division Chief of Telecommunications. Before joining the World Bank Group, James spent 10 years in the international oil industry, notably with the French oil company, TOTAL, and the French Institute of Petroleum. He has also worked for Goldfields—a South African mining company. James holds a Bachelors degree in chemical engineering from the University of Witwatersrand (Johannesburg, South Africa); a Masters degree in petroleum and energy economics from Ecole Française des Ingénieurs (ESPM); and a doctorate in economics (with a specialization in energy and strategic planning) from the University of Paris Pantheon-Sorbonne.

PHILIPPE CHARLES BENOIT, ENERGY SECTOR MANAGER, SUSTAINABLE DEVELOPMENT DEPARTMENT, LATIN AMERICA AND CARIBBEAN REGION, WORLD BANK

Philippe Charles Benoit is the Energy Sector Manager in the Sustainable Development Department of the Latin America and the Caribbean Region (LCR) of the World Bank. In this capacity, he is currently focusing on enhancing energy security in the LCR Region in an environmentally sustainable manner, taking into account climate change and other key development considerations. Mr. Benoit combines over twenty years of experience in energy (including power, oil and gas), both in the private sector and at the World Bank. His vast international expertise includes energy security issues in Latin America, energy efficiency projects in Latin America and Africa, IPPs in North America, regional pipelines in Europe, Central Asia and Africa, hydropower and other renewable projects in Latin America and Africa, access and utility reform issues in Africa and LNG development in the Middle East. At the World Bank, he has also worked with the energy group of the Africa Region and the Private Sector Development Department (specializing in Public Private Partnerships).
Outside of the Bank, Mr. Benoit held the positions of Director of Oil and Gas for the SG Investment Bank and Associate in Corporate Law at the Wall Street firm of Debevoise and Plimpton. Mr. Benoit's publications include "Project Finance at the World Bank: An Overview of Policies and Instruments". He holds a BA in Economics and Political Science from Yale University, a JD from Harvard Law School, and a DESS in Law from the University of Paris, Pantheon-Sorbonne.

KOFFI EKOUEVI, SENIOR ECONOMIST, SUSTAINABLE ENERGY DEPARTMENT, WORLD BANK



Koffi Ekouvi is a Senior Economist, in the Sustainable Energy Department at the World Bank. Over the last 13 years, he led energy policy dialogue in many African countries. He has worked on several energy projects covering energy sector reform, energy access, and regional power trade. His main areas of concentration include off-grid rural electrification and household energy access. Prior to joining the Bank in 1997, he worked with the United Nations in Senegal and with the Institute of Resource Development in the US.

CORINNE FIGUEREDO, SENIOR INVESTMENT OFFICER, INTERNATIONAL FINANCE CORPORATION

Corinne Figueredo is a Senior Investment Officer. From 2004 to 2009 Corinne led a donor-funded Cleantech venture investment pilot. She now works on the scaling up and mainstreaming of the pilot within IFC's Venture Team in the Global Information and Telecommunications Department. Other assignments within IFC include 6 years in IFC's infrastructure department, where she covered corporate and project finance in sectors such as transport, power, energy efficiency (ESCOs). Corinne has also worked in IFC's financial markets and general manufacturing groups. Transactions have ranged across Latin America, Asia, Eastern Europe. In 1992 Corinne moved from management consulting in the UK to IFC, until leaving in 1994 to obtain an MBA from INSEAD in France. Corinne holds a degree in modern languages from Cambridge University, UK.

DARYL FIELDS, SENIOR WATER RESOURCES SPECIALIST IN THE ENERGY UNIT, EUROPE AND CENTRAL ASIA, WORLD BANK

Daryl Fields is a Senior Water Resources Specialist in the Energy Unit for Europe and Central Asia at the World Bank. She is currently responsible for a regional program to enhance energy and water security in the office Central Asia countries, spanning hydropower development, transboundary water sharing, and institutional development. Previously, Daryl led the Bank-wide hydropower and multi-purpose water infrastructure functions and producing the Bank's Directions in Hydropower. Her project and analytical work focuses on sustainability and cross-sectoral water-energy issues including rehabilitation of hydropower facilities, benefit-sharing and cumulative impacts of cascade plants on water resources. Ms. Fields represents the World Bank on the multi-stakeholder Hydropower Sustainability Assessment Forum and supports projects in South Asia, Africa and Latin America. Before joining the World Bank in 2004, Daryl held management positions in Operations, Asset Management, Sustainability (Aboriginal Affairs, Environment), Strategic Planning, and the Office of the President of BC Hydro and Power Authority (Canada). Daryl was one of the original architects of BC Hydro's reoperations initiative and award-winning water use planning process. Daryl holds a M.Sc. (Economics) from the London School of Economics.

FRANZ GERNER, ENERGY SPECIALIST, OIL AND GAS POLICY GROUP, WORLD BANK/IFC

Franz Gerner, Energy Specialist, joined the Oil and Gas Policy Group of the World Bank/IFC in July 2003 focusing on the development of gas markets in Middle East and North Africa (Egypt, Jordan, Yemen, Lebanon), and Asia (Indonesia, Pakistan). Prior to joining the Bank, Franz worked for National Economic Research Associates (NERA) in its London and Sydney offices as an energy economist working on power and gas market regulations, sector reform and restructuring issues mostly in the UK, Germany, Bosnia & Herzegovina and Australia. At the Infrastructure Department, Franz focuses on developing energy markets in the region in particular, gas markets. Franz has a Ph.D. in Economics.

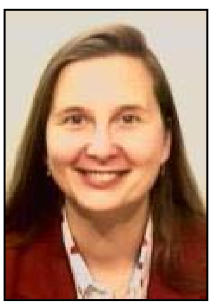
CHANDRA GOVINDARAJALU, SENIOR ENERGY SPECIALIST, WORLD BANK

Chandra Govindarajalu is Senior Energy Specialist at the World Bank and is leading the Concentrating Solar Power (CSP) technology market scale-up Initiative in MENA. He has also led technical studies related to Energy Efficiency, evaluation of Integrated Solar Combined Cycle (ISCC) projects, and review of off-grid electrification projects. He is co-author of the book "Financing Energy Efficiency: lessons from China, Brazil, India and beyond". Chandra holds a PhD in Energy and Environmental Policy from the University of Delaware, U.S.

VIJAY JAGANNATHAN, SECTOR MANAGER (INFRASTRUCTURE), EAST ASIA AND PACIFIC REGION, WORLD BANK

Vijay Jagannathan is Sector Manager (Infrastructure) in the East Asia and Pacific Region of the World Bank. The sector includes Energy, Transport, Urban Development and Water. The client countries of this region range from very large countries, such as China and Indonesia to the small island countries in the Pacific Ocean. His responsibilities include ensuring quality in the lending and Analytical and Advisory Services programs, maintaining liaison with the Anchor Units on staff development issues, ensuring that knowledge and learning takes place both within the approximately 200 staff members mapped to these four sectors, as well as between the region and other parts of the Bank. He is also leading the regional liaison and collaboration with APEC's various Green Growth initiatives. Prior to this assignment in July 2009, he was Sector Manager Water (and earlier also for Environment) in the Middle East and North Africa Region for six years. Before that he worked in the Philippines, Indonesia, Thailand and Cambodia in the water supply and sanitation sectors. Mr. Jagannathan joined the World Bank in 1991 after several years working in the Indian Administrative Service in development administration and economic planning. He holds a PhD in Economics from Boston University, and has specialized in institutional economics and infrastructure policy.

FANNY KATHINKA MISSFELDT-RINGIUS, SENIOR ENERGY ECONOMIST, WORLD BANK



Fanny Kathinka Missfeldt-Ringius is Senior Energy Economist at the World Bank. Fanny Kathinka joined the Bank in 2002 through the Young Professionals Program. Prior to the Banks she worked at UNEP Collab. Center on Energy and Environment as a Senior Economist and at the Royal Institute of International Affairs as Research Fellow. She holds a PhD in Economics from University of Stirling, and a M.Sc in Economics from University of Glasgow.

NATALIA KULICHENKO-LOTZ, SENIOR ENERGY SPECIALIST, SUSTAINABLE ENERGY DEPARTMENT, WORLD BANK.

Natalia Kulichenko-Lotz is a Senior Energy Specialist at the Sustainable Energy Department at the World Bank. Her work addresses the topics of advanced energy technologies, and related policy and project development. She holds a Ph.D. in Chemical Engineering, M.Sc. in Electrical Engineering, and MBA with specialization in international finance. Her expertise relates to power generation technologies including thermal and renewable energy power generation and energy efficiency programs. Dr. Kulichenko-Lotz works on assessment studies of financial and regulatory incentives for concentrating solar power projects in developing countries, and provides support to the Bank regional operational departments on development of concentrating solar power projects and related policy and regulatory frameworks. She is also a member of the management team for a multi donor trust fund addressing capacity building for deployment of carbon capture and storage technologies in developing countries, and prepares analytical studies related to the technical, financial and institutional aspects of carbon capture and storage installations. Dr. Kulichenko-Lotz previously worked in a number of U.S. government and international organizations including the U.S. Department of Energy, U.S. Environmental Protection

Agency, U.S. Agency for International Development and the Asian Development Bank as well as private companies and electric utilities. Her assignments focused on a variety of energy sector projects including thermal and renewable power generation (such as Integrated Gasification Combined Cycle plants, pulverized coal combustion and natural gas combustion, thermal solar power, hydro power) and advanced energy storage systems. A geographic range of her work includes Northern America, Southern Africa, the Maghreb countries, Eastern and Central Europe, Central Asia, and South and East Asia.

OEYVIND LIER, SENIOR HYDROPOWER SPECIALIST, WORLD BANK WATER ANCHOR UNIT

Oeyvind Lier is a Senior Hydropower Specialist for the World Bank Water anchor unit. He has provided technical assistance to bank projects in hydropower, led bank engagement in analytical work like Greenhouse Gases from Reservoirs and Rehabilitation of Hydropower, and in addition to assisting in hydropower related studies and strategies across the bank. His background is from the hydropower industry where he has worked on most aspects of hydropower development from concept to operation and maintenance. He holds a Master in Hydropower Engineering from the Norwegian University of Science and Technology as well as an Executive Master in Energy Management from a joint program by EACP Paris, Institute Francois de Petrol and the Norwegian University of Management.

LUCIO MONARI, SECTOR MANAGER, ENERGY ANCHOR, ENERGY, TRANSPORT AND WATER DEPARTMENT, WORLD BANK

Lucio Monari is the Sector Manager of the Energy Anchor in the Energy, Transport and Water Department. Before joining the Energy Anchor, Mr. Monari has been working in the Latin America and South Asia regions of the World Bank leading the policy dialogue in the energy sector. He has worked on several energy proje cts related to sector reform, energy access and renewable energy. He has published several reports on various energy sector issues, including power subsidies, impacts of reforms on the poor and attracting private sector investments in the power sector. Prior to joining the World Bank in 1990, he worked in international negotiations the oil industry.

KARI NYMAN, LEAD ENERGY SPECIALIST, WORLD BANK

Kari Nyman, Lead Energy Specialist, joined the Bank in 1991. Since 2002, he is working in the Europe and Central Asia (ECA) Region, in the Infrastructure and Energy Sector Department. From 1983 through 2001, Kari worked on energy policy, planning, project development, implementation and finance throughout the Asia region. In 1997-2001, he was the leader of the Bank's India energy team and member of the India country team. From 1983 until joining the World Bank in 1991, he worked with the Asian Development Bank as an economist and engineer. Kari's working experience in the 1976-1983 period included an international telecommunications/automation equipment/systems manufacturer, an energy-sector consulting firm, a power generator, and a municipal energy utility. Currently his working with energy and infrastructure strategy and privatization issues, team leadership of the Second Programmatic Adjustment lending operation in Romania and the Bank's regional lending facility (ECSEE APL) for the Energy Community of South East Europe, and other energy projects. Peer review and other cross-support assignments. He did his degrees in microeconomics and civil law (Tampere University) and electrical engineering and industrial economics (Tampere Institute of Technology), Tampere, Finland.

ASHOK SARKAR, SENIOR ENERGY SPECIALIST, ENERGY ANCHOR, WORLD BANK

Ashok Sarkar is Senior Energy Specialist, Energy Anchor in The World Bank. He has over 18 years of international energy sector development experience spanning lending and non-lending operations across several regions. As the thematic group leader for energy efficiency, he currently coordinates the World Bank's overall efforts and manages strategic initiatives for scaling up its energy efficiency portfolio. He is also involved in energy efficiency and climate change mitigation operations in Bangladesh, Mexico, and Pakistan. Prior to joining the World Bank in 2005, he managed sustainable energy projects at the Asian Development Bank in Manila, Philippines; the US Agency for International Development's Office of Energy, Environment and Enterprise in India; and in Resource Management Associates, Inc., an international energy consulting firm based in Madison, Wisconsin. Ashok began his professional career as a power sector design engineer in 1984 with the Bharat Heavy Electricals Limited in India. He has a BS in Mechanical Engineering from the University of Delhi, an MS in Energy Planning and Policy from the Asian Institute of Technology in Thailand, and a Ph.D. from the University of Wisconsin-Madison. Between 2005 and 2007, he had served as an international expert member of the Clean Development Mechanism Methodologies Panel (the Meth Panel) to the UNFCCC. Since 1997, he has been a regular visiting summer faculty at the University of Oslo's program on Energy Planning and Sustainable Development.

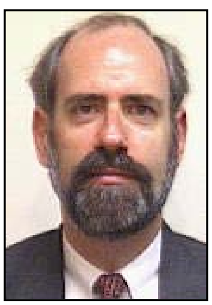
JONATHAN WALTERS, DIRECTOR, REGIONAL STRATEGY AND PROGRAMS, MIDDLE EAST AND NORTH AFRICA REGION, WORLD BANK

Jonathan Walters is the Director for Regional Strategy and Programs in the Middle East and North Africa Region of the World Bank. He joined the World Bank in 1988, and initially worked on macroeconomic reform in West and Central Africa. He then joined the Europe and Central Asia Region just after the break-up of the Soviet Union, where he focused on energy sector reform, energy investment projects, and Caspian oil and gas development. In 2001, he joined BP in London under the Staff Exchange Program, and worked on relationships with national oil companies and on the design of the Extractive Industries Transparency Initiative. Mr. Walters returned to the World Bank in 2003, and led a major study ("Connecting East Asia") on infrastructure service provision in East Asia and the Pacific, in collaboration with the Asian Development Bank and the Japan Bank for International Cooperation. He has since held various positions, his most recent assignment being Sector Manager, Energy and Transport in the Sustainable Development Department of the MNA region. Mr. Walters took up his present position in July 2010. Prior to joining the World Bank, he was the Economic Advisor to the Government of Swaziland on investment climate, trade policy, and promotion of small and medium industries. He has an M.A. in Politics and Philosophy from the University of Oxford, and an M.Sc. in Economics from the University of London.

SHINJI YAMAMOTO, CHIEF INVESTMENT OFFICER, POWER AND RENEWABLE TEAM, INFRASTRUCTURE AND NATURAL RESOURCE DEPARTMENT, INTERNATIONAL FINANCE CORPORATION

Shinji Yamamoto is Chief Investment Officer, Power and Renewable Team, Infrastructure and Natural Resource Department, International Finance Corporation. He joined IFC via the World Bank Young Professional Program in 1992 with prior work experience at Sony Corp and Mckinsey & Co. Led a number of project and corporate financing transactions in various sector, including textiles, tourism, and construction materials, in Asia, Central Asia, and North Africa. Engaged in advisory services for infrastructure and other projects in Philippines (water) and Indonesia (all sectors). Focused primarily on financing power projects of various types - thermal, hydro, and renewable electricity generation as well as distribution utilities around the world, in East Asia, the Caribbean and Latin America, in the past decade. Invested in several geothermal projects in the recent years, with a total installed capacity of more than 1000MW. Oxon, Engineering and Economics, Bsc.; HBS, MBA.

DANA REED YOUNGER, SENIOR RENEWABLE ENERGY ADVISER ON THE POWER & RENEWABLES TEAM, GLOBAL INFRASTRUCTURE & NATURAL RESOURCES DEPARTMENT, INTERNATIONAL FINANCE CORPORATION



Dana Reed Younger is senior renewable energy adviser on the power & renewables team in the Global Infrastructure & Natural Resources Department of the International Finance Corporation (IFC). IFC, the private sector lending arm of the World Bank Group based in Washington, D.C., committed $14.5 billion in financing for 447 projects in 103 countries during fiscal year 2009. IFC financed more than $1 billion in renewable energy and energy efficiency projects during fiscal year 2009. This included wind projects in Bulgaria, Chile & Turkey totaling >300 MW. Mr. Younger acts as lead business developer for large grid-connected renewable energy transactions with a special emphasis on wind energy as well as run-of-river hydro, geothermal, solar energy, and biomass power projects. He is presently involved in mobilizing financing for two wind projects in Mexico totaling >300 MW as well as some 1,500 MW of wind projects in other developing countries as well as other renewable energy projects. He authored the lead article on “Renewable Energy Finance in Emerging Markets” in EUROMONEY’s International Power & Utilities Finance Review 2006/2007. He represented the President of the World Bank Group and IFC’s Executive Vice President on the G8 Renewable Energy Task Force (2000/2001). He is an acknowledged international expert on renewable energy who speaks frequently at international wind, solar, geothermal and renewables conferences.

US POLICY BRIEFING

JAMES T. WALSH, GOVERNMENT AFFAIRS COUNSELOR, K&L GATES LLP

Mr. Walsh is a government affairs counselor in the firm's Washington, D.C. office. He was elected to the U.S. House of Representatives where he served from 1989 to 2009. During his tenure in Congress, Mr. Walsh served as a deputy Republican whip from 1994-2006. He was appointed as a member of the powerful House Appropriations Committee where he served from 1993-2009. During that time he became Chairman of four House Appropriations Subcommittees: District of Columbia; Legislative Branch; VA, HUD and Independent Agencies (NASA, EPA, FEMA, NSF, Selective Service); and Military Quality of Life and Veterans Affairs. He also served as ranking Republican member of the Labor, Health and Human Services Sub-committee on Appropriations. Earlier in his career in Congress Mr. Walsh served on the House Agriculture Committee, the Select Committee on Children, Youth and Families and on the House Administration Committee.

Mr. Walsh served as a Peace Corps volunteer in Nepal from 1970-1972 as an agriculture extension agent in the Bara province near the Indian border. Upon his return to the United States, he worked as a social worker doing case management in Central New York State. Subsequently, he joined the New York Telephone Company/NYNEX in Syracuse, New York where he served in a number of capacities, primarily in marketing, until 1986.

CRAIG O'CONNOR, DIRECTOR, OFFICE OF RENEWABLE ENERGY & ENVIRONMENTAL EXPORTS, THE EXPORT-IMPORT BANK OF THE UNITED STATES

Mr. O'Connor was appointed as the Bank's Environmental Liaison Officer in 1994, to implement the Bank's top-priority mission to increase its support for environmentally beneficial exports. Mr. O'Connor created and managed the Bank's Environmental Exports Program, which grew from 5 projects in fiscal year 1994 to hundreds of individual transactions by 2009, for a total portfolio in excess of $3 billion. Mr. O'Connor was appointed as the Director of Ex-Im Bank's Office of Renewable Energy & Environmental Exports in 2007.

Mr. O'Connor works closely with U.S. renewable energy exporters to create "Bankable" project structures that can support approval by Ex-Im Bank. Among his more notable recent transactions are the multi-million dollar Short-Term Facility for Infinia Solar; and, the $80MM Clipper Windpower Project in Mexico that is Clipper's first-ever export sale.

Mr. O'Connor began his career at the Bank in January 1993, as a Loan Officer in the Export Credit Insurance Division covering the Middle East and North Africa. Mr. O'Connor has represented the Bank on over 50 international missions. In addition to his position at the Bank, Mr. O'Connor has served as an Adjunct Professor of International Business at Georgetown University since the Spring Semester of 1997. In May 2003, he was presented with Georgetown University's Adjunct Faculty of the Year award.

ASIAN DEVELOPMENT BANK

ANIL TERWAY, SENIOR ADVISOR AND PRACTICE LEADER (ENERGY), REGIONAL AND SUSTAINABLE DEVELOPMENT DEPARTMENT, ASIAN DEVELOPMENT BANK

Mr. Anil Terway is the Senior Advisor and Practice Leader (Energy) in the Regional and Sustainable Development Department of the Asian Development Bank (ADB). In these roles, Mr. Terway leads and supports ADB's energy sector operations under ADB's long-term institutional strategy, called *Strategy 2020*. Mr. Terway also co-chairs ADB's community of practices for energy and the Clean Energy Working Group. Previously, he led ADB's energy sector operations in the People's Republic of China and Mongolia for four years. Mr. Terway has more than nine years of experience in developing and supervising energy projects and programs in east, central and southeast Asia.

Prior to joining ADB in 1996, Mr. Terway worked in India, where he was a member of the management consulting team of PriceWaterhouse Coopers. He held various operational positions in large thermal power stations, and brings to his work 20 years' experience in power company corporate planning. Mr. Terway also spent time working in an integrated steel plant. Mr. Terway holds a degree in electrical engineering from Benaras Hindu University (India) and an MBA from Ateneo de Manila University (Philippines).

INTER-AMERICAN DEVELOPMENT BANK

STEVEN J.PUIG, VICE PRESIDENT FOR PRIVATE SECTOR OPERATIONS, INTER-AMERICAN DEVELOPMENT BANK

Steven J. Puig, a dual citizen of the Dominican Republic and the United States, was appointed Vice President for the Private Sector and Non-Sovereign Guaranteed Operations, at the Inter-American Development Ban k, effective November 7, 2007.

Mr. Puig is be responsible for coordinating the private sector and non-sovereign guaranteed operational programs of the IDB Group, the develop-ment and implementation of a private sector integrated business plan, as well as the business plans of each of the group´s private sector entities. The IDB Group is composed of the IDB, the Multilateral Investment Fund (MIF) and the Inter-American Investment Corporation (IIC). The area under Mr. Puig´s responsibility includes the IDB´s Structured and Corporate Finance Depart-ment (SCF) and the Opportunities for the Majority Sector (OMJ).

Prior to joining the IDB, Mr. Puig held a number of positions with Citigroup. From 2004 to 2007, he was Global Head of Trade for Latin America in Miami. From 2001 to 2004, he was Country Corporate Officer in Colombia. From 1998 to 2000, he was Country Corporate Officer in El Salvador. Prior to that, Mr. Puig was Vice President of Corporate Banking and Corporate Finance in the Dominican Republic. Before joining Citigroup, Mr. Puig served on the management team of two commercial groups in the Dominican Republic, Grupo Ambar and Grupo Reid & Perellano.

Mr. Puig holds a master's degree in International Management from the American Graduate School of International Management of Arizona, and a degree in Economics and International Finance and Commerce from George-town University's Edmund A. Walsh School of Foreign Service, Washington, D.C.

LEANDRO ALVES, HEAD OF THE ENERGY DIVISION, INFRASTRUCTURE AND ENVIRONMENT DEPARTMENT, INTER-AMERICAN DEVELOPMENT BANK

Mr. Leandro Alves is Head of the Energy Division of the Infrastructure and Environment Department of the Inter-American Development Bank (IDB), re-possible for Energy, Oil and Gas, Extractive Industries, and Biofuels for the Latin America and the Caribbean region. The Energy Division of the IDB structures projects with sovereign guarantees, public sector projects without the sovereign guarantee, and projects with public private partnership characteristics.

Prior to Mr. Alves' appointment as Head of the Energy Division, he was Sen-ior Investment Officer for the Structured and Corporate Finance Department SCF of the IDB, responsible for over US$1 billion in structured finance trans-actions in the energy sector. During his employment with the Structured and Corporate Finance Department, Mr. Alves has led the structuring of financing of numerous projects including: the Moema Biofuels Project, the Campos Novos Hydroelectric Power Project, the Novatrans Transmission Line, the Bandeirante's Electricity Distribution Project, and participated in the IDB's 1st Political Risk Guarantee to VBC Energy in Brazil, amongst others.

Prior to joining the Corporate and Structured Finance Department Mr. Alves worked in the Finance and Infrastructure Division of the IDB, at the Interna-tional Finance Corporation (IFC), and at The World Bank. Mr. Alves has a Bachelors of Arts in Economics from the University of Maryland, a MBA and a MSIM from Marymount University, and a Ph.D. in Finance from the George Washington University.

AFRICAN DEVELOPMENT BANK

RICHARD CLAUDET, CHIEF INVESTMENT OFFICER, PRIVATE SECTOR INFRASTRUCTURE DEPARTMENT, AFRICAN DEVELOPMENT BANK

Richard Claudet is Chief Investment Officer in the Private Sector Infrastructure Department of the African Development Bank. Richard has in-depth experience in infrastructure project finance on a global basis, and has worked as a developer and financier of hydro, wind, solar and diverse varieties of thermal plants. While renewable and clean energy projects and financing schemes are a recent area of focus, Richard has also worked in satellite telecommunications, transportation, and manufacturing. His interests include anything to do with science and technology, running, windsurfing and contract bridge. Richard has an MA in Chemistry from Oxford University, and an MBA from the Wharton School, University of Pennsylvania.

EMMANUEL NZABANITA, MANAGER ENERGY DIVISION, AFRICAN DEVELOPMENT BANK

Mr Emmanuel Nzabanita (currently acting Manager Energy Division responsible for East and South Regions) is an Electrical Engineer with an experience of 39 years in the power sector. He has been working with the African Development Bank for over a decade and has attained the rank of Chief Power Engineer. Prior to this rank, he worked as a Senior Power Engineer in the infrastructure and Industry division, principal operations expert in Egypt ADB country office and principal power engineer at the ADB Headquarters. In all his endeavour, his work centred the development of power networks including power system interconnections and generation facilities in Egypt and East and central African region.

Prior to joining ADB, he rose through the ranks in the then Uganda Electricity Board to become the General Manager in charge of Power Transmission. His tasks included among other things electricity investment planning, high voltage transmission line construction and power system protection. He implemented extensive rural electrification programmes in Uganda and the extension of high voltage lines countrywide.

He graduated with an honours B.sc Degree from the Faculty of Engineering at Makerere University in Uganda in 1977 and a Master of Science Degree in engineering from the Institute of Science and Technology at Manchester University in UK in 1986. He is a member of the Institute of Electrical and Electronic Engineers (IEEE) of USA and of Professional Engineers in Uganda. He also has a certificate in Management from Crane field school of Management in UK.

MILLENNIUM CHALLENGE CORPORATION

MATT HARSHA-STRONG, PROGRAM OFFICER FOR PRIVATE SECTOR, MILENNIUM CHALLENGE CORPORATION

Matt Harsha-Strong is Program Officer for Private Sector at the Millennium Challenge Corporation (MCC). He seeks to leverage MCC's grants of up to $700MM per country with private project finance, trade, and investment. Matt has edited MCC's PPP toolkit, brokered advisory partnerships, instituted a training program, created project templates, and advanced pilot transactions in Jordan wastewater, Malawi energy, Mali transport, and others spanning sectors and continents.

Previously, Matt served in the economic growth bureau of the US Agency for International Development in Washington, Bangkok, and Hanoi. He has also worked in the nuclear security office of the International Atomic Energy Agency and in the Near East and Western Hemisphere sections of the Office of the Secretary of Defense. In addition, Matt performed three years of research assistance to Yale University professors and helped launch an Arabic translation company.

Matt holds a B.A. in development studies with distinction from Yale University and is obtaining his MBA from the Wharton School of Business. He has passed the Level 1, 2 & 3 exams of the Chartered Financial Analyst (CFA) Program and earned the Certified PPP Specialist designation from IP3 through eight courses over two years. A visitor to 37 countries, he is proficient in Arabic.

MIKE MCENTIRE, SENIOR DIRECTOR, PROGRAM PROCUREMENT POLICY, MILLENNIUM CHALLENGE CORPORATION

Mike McEntire is Senior Director for Program Procurement Policy at the Millennium Challenge Corporation. He oversees the development and implementation of program-related procurement policy and procedures and monitors the execution of program procurements during Compact implementation.

Prior to joining MCC, Mr. McEntire served for more than 23 years with the United States Air Force, both as a civil servant and a military officer. His assignments included over 15 years of procurement-related duties as a contracting officer in system program offices responsible for development and fielding of command and control systems; in contracting policy, inspection, and force development for Air Force Materiel Command; and on the staff of the Assistant Secretary of the Air Force for Acquisition. In his last Air Force assignment, Mike served as contracting branch chief for the Air Force Rapid Capabilities Office, which handles a select portfolio directly for the Air Force Secretary and Chief of Staff. Along the way, Mike was detailed to NATO and deployed to Sarajevo as the Theatre Head of Contracts for the UN-mandated/NATO-led 38-nation Peace Stabilisation Force (SFOR) for Bosnia-Herzegovina and Croatia. This brief assignment, during which he reorganized and consolidated the Theatre Allied Contracting Offices and formalized many of the procurement procedures which were later adapted for the NATO-led peacekeeping missions in Kosovo and Afghanistan, led to an appointment to the NATO Airborne Early Warning & Control Programme Management Agency in The Netherlands, where he led a business team managing the procurement and financial aspects of development and modernization programs for NATO's AWACS aircraft fleet.

JONATHAN SAIGER, TEAM LEADER, INFRASTRUCTURE, MILLENNIUM CHALLENGE CORPORATION

Jonathan S. Saiger, Team Leader, Infrastructure for the Millennium Challenge Corporation (MCC), oversees the proposal assessment and project implementation of infrastructure activities in proposed and approved Compacts. Jonathan Saiger has extensive project and corporate finance experience developed over more than 20 years at both advisory and lending institutions. He has advised domestic and foreign companies and foreign government agencies on policy matters in the water, sanitation, and energy sectors. He has arranged financing for the development and construction of conventional and renewable energy projects and companies.

From 2003 to 2005 Mr. Saiger was Senior Vice President of NexGen Power LLC, a private investment company focusing on energy and process asset acquisitions. From 1998 to 2002 Mr. Saiger was a vice president in the Energy and Infrastructure Investment Banking Group at PricewaterhouseCoopers Securities LLC. From 1994 to 2002 at PricewaterhouseCoopers LLP and its predecessor Price Waterhouse LLP, he advised on several power project developments, private equity investments, utility-restructuring assignments and investment due diligence activities. His international advisory work during that period included several assignments in Central, South and Southeast Asia involving utility privatization and utility policy. At Cogeneration Capital Associates Incorporated and at his own firm, he managed numerous advisory assignments and placement engagements. Previously at Bank of America, his project finance lending and advisory activities involved both overseas and domestic energy projects.

Mr. Saiger received Bachelor of Arts in Economics and Philosophy from Stanford University. Mr. Saiger was an adjunct professor at Georgetown University's McDonough School of Business where he taught project finance in the MBA program and was a mentor to undergraduate business students. Mr. Saiger has also taught project finance and international finance courses in Bangladesh, Pakistan and the Philippines.

UNITED NATIONS

NATALIE AFRICA, PROGRAM MANAGER, BUSINESS CALL TO ACTION SECRETARIAT

Natalie heads up the BCtA Secretariat, and is responsible for coordinating and expanding the BCtA activities. Natalie joined the BCtA from the International Finance Corporation (IFC) where she innovated and ran projects aimed at promoting women in business through access to finance, business training and supply chain opportunities. Before IFC, Natalie worked in structured trade and finance at Absa Bank, and also served as a diplomat with the South African Foreign Service. Natalie has also spent several years working on women's development issues in the non-profit sector. Natalie holds an MA in International Relations from the Graduate Institute of International Studies in Geneva and a BA in History from the University of Lyon III, France.

JONATHAN ANDREWS, CHIEF OF STAFF, BUREAU FOR CRISIS PREVENTION AND RECOVERY, UNDP

BPCP's External Relations team is overseen by Jonathan Andrews, BCPR's new Chief of Staff who joined in June 2010. Jonathan was previously the Senior Strategic Partnerships Advisor in the UN's Peacebuilding Support Office (PBSO) in New York, involved in expanding and improving the implementation of the Peacebuilding Fund (PBF) with systems, programme design and monitoring and evaluation. Previously Jonathan worked with DPKO in Liberia and with UNHCR in numerous conflict and transitional settings. He has spent 16 years in Africa, also working for Oxfam and the Government of Botswana.

TARIQ BANURI, DIRECTOR, DIVISION FOR SUSTAINABLE DEVELOPMENT, UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS (DESA)

Tariq Banuri has broad experience on the interface between policy, research, and practical actions on the realization of the goal of sustainable development.

He has worked in government, academia, civil society, and the international system.Before joining the United Nations, he was Senior Fellow and Director of the Future Sustainability Program at the Stockholm Environment Institute.

He started his career in the Civil Service of Pakistan, went on to receive a PhD in Economics from Harvard University, joined the United Nations as a Research Fellow at the World Institute for Development Economics Research (WIDER), a model that he adopted in setting up and serving as the founding Executive Director of the Sustainable Development Policy Institute (SDPI) in Pakistan.

He has served on national as well as international forums for policy, advocacy, and research, including as a Coordinating Lead Author on the Nobel Prize-winning Inter-governmental Panel on Climate Change (IPCC), as member of the board of governors of Pakistan's central bank, and of the Pakistan Environmental Protection Council, and member/secretary of Pakistan's Presidential Steering Committee on Higher Education.He has also served as the chair of the Board of Governors of the International Centre for Trade and Sustainable Development (ICTSD), and was a founding member of the Great Transition Initiative (GTI).

GEORG KELL, EXECUTIVE DIRECTOR, UNITED NATIONS GLOBAL COMPACT

Georg Kell is the Executive Director of the United Nations Global Compact, the world's largest voluntary corporate responsibility initiative with more than 6,000 participants in over 130 countries. Spanning more than two decades, his career with the United Nations began in 1987 at the UN Conference on Trade and Development (UNCTAD) in Geneva. In 1997, Mr. Kell joined the Office of the UN Secretary-General in New York, where he spearheaded the development of new strategies to enhance private sector engagement with the work of the United Nations. As one of the Global Compact's key architects, he has led the initiative since its launch in 2000, building the most widely recognized global business platform on human rights, labour, environment, and anti-corruption. Prior to joining the UN System, Mr. Kell worked as a researcher at the Fraunhofer Institute in Germany and as a financial analyst evaluating multinational companies' investment portfolios in Asia and Africa. A native of Germany, he holds advanced degrees in economics and engineering from the Technical University of Berlin.

JACOB WILLEMSEN, FOUNDER AND OWNER, NEW AMSTERDAM TRADE & CONSULTANCY LLC

Since 2002 Jacob has advised and represented government and corporate clients in the UN-Procurement Market. He was Founder of the European Procurement Forum Inc., a cooperation of EU trade representations to the United Nations Headquarters and since 2003, coordinator of the annual EU UN-Procurement Seminar. He was also Coordinator for the 2004 and 2009 NEXCO UN Procurement Seminar. From 1997 to 2001 Jacob worked as Trade Commissioner and Deputy Head of the economic section for the Consulate General of the Netherlands in New York.

MOHAMED YAHYA, PROJECT MANAGER OF NATURAL RESOURCES AND CONFLICT PREVENTION AT UN INTERAGENCY FOR PREVENTIVE ACTION

Mohamed is the UN focal point on Natural Resources and manager of UN-EU project on Natural Resources and conflict. Previously Mohamed was Technical Advisor to Afghan Parliament and led UNs Diamonds for Development Programme in West Africa. Currently in close collaboration with Business call to Action Mohamed is working on an initiative to secure an active role for the private sector in Peacebuidling in post-conflict countries.

THE ENERGY SECTOR WITHIN THE WORLD BANK GROUP

The World Bank comprises of two institutions: the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). These institutions - along with the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA) and the International Centre for Settlement of Investment Disputes (ICSID) - make up the World Bank Group. Each institution specializes in a different aspect of development, but they all have the same goal: a world free of poverty. The World Bank exchanges ideas with countries on which policies are best suited to achieving their development goals and provides them with technical and financial assistance. IBRD's clients are middle-income and creditworthy poorer countries, while IDA focuses exclusively on the poorest countries. The World Bank operates like a cooperative, with developing and developed country members functioning as shareholders. Their representatives, the Executive Directors, set Bank policies and oversee its operations. World Bank programs give high priority to sustainable human and social development to strengthened economic management, with an emphasis on inclusion, governance, and institution building. Grants and loans obtained from co financiers and partnerships often complement the government funds and World Bank lending to make up the total package of assistance to a country.

The International Finance Corporation (IFC) is the private-sector investment entity of the World Bank Group. It invests in sustainable private enterprises in developing and transitional countries without requiring sovereign guarantees. It provides equity, long-term loans, structured finance and risk management products, as well as technical assistance and advisory services to its clients.

The Multilateral Investment Guarantee Agency (MIGA) provides noncommercial guarantees (insurance) for foreign direct investment in developing countries. It addresses concerns about investment environments and perceptions of risk, which often inhibit investment, by providing political risk insurance. MIGA's guarantees offer investors protection against noncommercial risks such as expropriation, currency inconvertibility, breach of contract, war, and civil disturbance.

On October 7, 2010 The World Bank Group announced that its financing commitments to new renewable energy projects increased to $1.5 billion in 2010, more than triple the amount committed in 2008. Energy efficiency lending increased 48 percent during the same period.

The figures confirm the institution is on track to meet its commitment to increase support for new renewable energy and energy efficiency by nearly $8.8 billion over 2008-2012. “Combined with our large hydropower commitments, this amounts to $3.63 billion for green energy,” said Inger Andersen, the Bank’s Vice President for Sustainable Development. “It’s a record for the World Bank Group, and clear evidence of a shared commitment between the institution and borrowing countries to invest in a sustainable energy future.” In 2010, the Bank Group commitments on renewable energy, energy efficiency, transmission and distribution, and energy sector reform accounted for more than 60 percent of total energy financing. The lending covers approvals for 118 renewable energy and energy efficiency projects in 51 countries, raising the total number of projects of this kind to 428, under way in 100 countries. The composition of energy lending has shifted in response to demand from borrowing countries, whose leaders increasingly ask for assistance promoting renewable energy, energy efficiency policies, and other low carbon measures. Inger Andersen has pointed out that the Bank is meeting the challenge to help developing countries deliver electricity to 1.5 billion people who are without it—640 million of whom are in Africa—without aggravating climate change, and without constraining efforts at growth and poverty reduction.

Table 1: WBG Energy Investments by Project Type, (US $ million)

Project Type	2005	2006	2007	2008	2009	2010	Grand Total
Energy Efficiency	217	761	262	1,192	1,711	1,771	5,914
Large Hydropower Plants	538	250	751	1,007	177	284	3,008
New Renewable Energy	246	344	421	473	1,517	1,584	4,585
Oil, Gas and Coal (Upstream)	578	1,074	627	981	1,032	914	5,206
Other Energy	278	248	375	903	1,752	2,022	5,577
Thermal Generation	100	511	360	957	936	4,270	7,133
Transmission and Distribution	906	1,465	809	2,031	1,204	2,171	8,587
Energy Total	2,864	4,653	3,604	7,545	8,328	13,016	40,009
Total Low Carbon1	1,237	1,660	1,440	3,003	3,405	5,519	16,265
Total Access1	1,136	1,018	1,239	2,284	2,201	1,025	8,903

[1] These categories are not mutually exclusive, as some projects are classified as blended low carbon and access. Note: Some columns and rows may not add up exactly due to rounding.

Table 2: World Bank Group Energy investments by institution (US $ million)

Institution	2005	2006	2007	2008	2009	2010	Grand Total
World Bank	1,868	3,155	2,016	4,512	6,648	10,370	28,571
IBRD	593	1,565	504	2,674	3,569	8,140	17,045
IDA	712	1,441	1,070	1,420	2,155	1,359	8,157
Global Environment Facility	105	51	128	145	84	19	533
CTF	-	-	-	-	100	500	600
Others	458	98	314	272	740	353	2,235
IFC	764	1,308	1,170	2,923	1,647	2,421	10,233
MIGA	232	190	417	110	33	225	1,206
Energy Total	2,864	4,653	3,604	7,545	8,328	13,016	40,009

Note: Some columns and rows may not add up exactly due to rounding.

PIPELINE PROJECTS IN THE ENERGY SECTOR - WORLD BANK

PROJECT ID	PROJECT NAME	REGION	COUNTRY	COST	TEAM LEAD
P075941	NELSAP: Regional Rusumo Falls Hydroelectric and Multipurpose Project	AFRICA	Africa	190	Ueda, Satoru
P084773	VN-Trung Son Hydropower Project	EAST ASIA AND PACIFIC	Vietnam	373.39	Spencer, Richard Jeremy
P087861	South Zone Power Distribution Project	SOUTH ASIA	Bangladesh	200	Anis, Mohammad
P094746	DBSA Regional Carbon Finance Operation	AFRICA	Africa	20	Capoor, Karan
P094919	WAPP APL 3 (INTER-ZONAL TRANSMISSION HUB)	AFRICA	Africa	110	Diaw, Issa
P096124	Vishnugad Pipalkoti Hydro Electric Project	SOUTH ASIA	India	879	Haney, Michael
P096586	UA - ENERGY EFFICIENCY	EUROPE AND CENTRAL ASIA	Ukraine	500	Stuggins, Gary
P099375	Mineral Sector Technical Assistance	SOUTH ASIA	Pakistan	47	Stanley, Michael C.
P100203	African Rift Geothermal Development Program (ARGeo)	AFRICA	Africa	17.75	Fernstrom, Erik Magnus
P101414	Eastern Caribbean Energy Regulatory Authority (ECERA)	LATIN AMERICA AND CARIBBEAN	OECS Countries	6.87	Audinet, Pierre
P101618	Programmatic Private and Financial Development Policy Loan 3	EUROPE AND CENTRAL ASIA	Serbia	100	Ferrari, Aurora
P102843	Luhri Hydro Electric Project	SOUTH ASIA	India	1150	Gaba, Kwawu Mensan
P104470	Rural Electrification and Transmission Project	EAST ASIA AND PACIFIC	Cambodia	0	Tang, Jie
P106069	Al-Mocha Wind Park	MIDDLE EAST AND NORTH AFRICA	Yemen, Republic of	125	Zhao, Jianping
P106424	Efficient lighting and appliances	LATIN AMERICA AND CARIBBEAN	Mexico	329.12	Aiello, Roberto Gabriel
P106518	China Xinjiang Aksu Pig Farm Biogas Project	EAST ASIA AND PACIFIC	China	2.38	Minasyan, Gayane
P106832	Ulaanbaatar Clean Air	EAST ASIA AND PACIFIC	Mongolia	23	Draugelis, Gailius J.
P108934	Regional Transmission Development APL	AFRICA	Africa	500	Mukherji, Somin
P110177	Cameroon - Partial Risk Guarantees for Kribi Gas Power Project	AFRICA	Cameroon	394	Manroth, Astrid
P110729	Central Asia South Asia Electricity Transmission and Trade Project (CASA 1000)	SOUTH ASIA	South Asia	610	Sharma, Raghuveer Y.
P110946	PAKISTAN - Technical Assistance Loan for the implementation of the National Environment Policy	SOUTH ASIA	Pakistan	28	Sanchez-Triana, Ernesto
P112158	Upper Cisokan Pumped Storage Power Project	EAST ASIA AND PACIFIC	Indonesia	776	Wang, Leiping
P112780	Jamaica Energy Investments and TA	LATIN AMERICA AND CARIBBEAN	Jamaica	15	Layec, Michel E.
P112893	Kabeli Transmission Project	SOUTH ASIA	Nepal	26	Haney, Michael
P113078	Geothermal Clean Energy Investment Project	EAST ASIA AND PACIFIC	Indonesia	567.6	Jayawardena, Migara
P113173	PCB Management Project	AFRICA	Nigeria	18.5	Olojoba, Africa Eshogba
P113266	WAPP APL4 (Phase 1) - Côte d'Ivoire, Sierra Leone, Liberia, and Guinea Power System Re-development	AFRICA	Africa	200	Missfeldt-Ringius, Fanny Kathinka
P114077	CM - Lom Pangar Hydropower Proj. (FY11)	AFRICA	Cameroon	430	Manroth, Astrid
P114278	Thar Coal and Power Technical Assistance	SOUTH ASIA	Pakistan	30	Stanley, Michael C.
P114971	PY Energy Sector Strengthening Project	LATIN AMERICA AND CARIBBEAN	Paraguay	125	Reinstein, David
P115680	PCG to Russia Development Bank for Infrastructure Finance	EUROPE AND CENTRAL ASIA	Russian Federation	500	Cuttaree, Vickram
P116013	POPs Elimination, Mitigation and Site Management Project	EUROPE AND CENTRAL ASIA	Tajikistan	12.04	Arin, Tijen

P116533	Africa Mineral Governance Project APL1	AFRICA	Africa	31	Bocoum, Boubacar
P116680	Electricity Supply Reliability and Energy Efficiency Project	EUROPE AND CENTRAL ASIA	Armenia	18.9	Balabanyan, Ani
P116748	Electricity Supply Reliability and Energy Efficiency Project	EUROPE AND CENTRAL ASIA	Armenia	44	Balabanyan, Ani
P116919	Alma Transmission Project	EUROPE AND CENTRAL ASIA	Kazakhstan	200.9	Hizkil, Imtiaz
P116974	AR Third National Communication UNFCCC	LATIN AMERICA AND CARIBBEAN	Argentina	3.05	Acerbi, Marcelo Hector
P117177	GEF Project: Lao Rural Electrification Phase II Project	EAST ASIA AND PACIFIC	Lao People's Democratic Republic	3	Tang, Jie
P117333	GREEN INVESTMENT SCHEME	EUROPE AND CENTRAL ASIA	Poland	30	Slaibi, Ahmad
P117864	Peru Second Rural Electrification Project	LATIN AMERICA AND CARIBBEAN	Peru	100	Bogach, Susan V.
P118109	MN-Mining Infrastructure Capacity Build	EAST ASIA AND PACIFIC	Mongolia	10.25	Reichert, James A.
P118112	Ghana Skills and Technology Development Project	AFRICA	Ghana	120	Darvas, Peter
P118605	Efficient Lighting Initiative for Bangladesh	SOUTH ASIA	Bangladesh	15	Banerjee, Arun
P119654	GEF Green Truck Demonstration Project	EAST ASIA AND PACIFIC	China	21.6	Fang, Ke
P119715	Lao PDR: AUSAID Grant Additional Financing of the Rural Electrification Phase I	EAST ASIA AND PACIFIC	Lao People's Democratic Republic	14.61	Tang, Jie
P119737	Electricity Sector Development Project	AFRICA	Uganda	145.12	Mukherji, Somin
P119939	Talimarjan Transmission Project	EUROPE AND CENTRAL ASIA	Uzbekistan	155	Visa, Doina
P120005	Gas and Oil Capacity Building Project	AFRICA	Ghana	42	Mathrani, Sunil W.
P120166	MA-Energy Development Fund	MIDDLE EAST AND NORTH AFRICA	Morocco	250	Pariente-David, Silvia
P120589	Natural Gas Efficiency Project	SOUTH ASIA	Pakistan	250	Hamso, Bjorn
P120654	MX GEF Efficient lighting and appliances	LATIN AMERICA AND CARIBBEAN	Mexico	192.12	Aiello, Roberto Gabriel
P120660	LIBERIA Electricity System Enhancement Project (LESEP)	AFRICA	Liberia	53	Missfeldt-Ringius, Fanny Kathinka
P120764	BMA Urban Transformation Project	EAST ASIA AND PACIFIC	Thailand	400	Westra, Reindert
P120765	EGAT And PEA Advancing Clean Energy Investment - CTF	EAST ASIA AND PACIFIC	Thailand	570	Fraser, Julia M.
P120825	MW: Mining Technical Assistance Project	AFRICA	Malawi	25	Land, Bryan Christopher
P120932	China Technology Needs Assessment (TNA)	EAST ASIA AND PACIFIC	China	5.8	Coony, Jonathan d'Entremont
P121298	Afghanistan Rural Solar Electrification Project	SOUTH ASIA	Afghanistan	20	Naessl, Manuela
P121800	MEDEC Low-Carbon DPL Loan	LATIN AMERICA AND CARIBBEAN	Mexico	400	Johnson, Todd M.
P121812	Cape Verde - DPL 1/PRSC VI	AFRICA	Cape Verde	10	Blanco Cossio, Fernando Andres
P121980	Integrated National Energy Strategy TA Additional Financing	MIDDLE EAST AND NORTH AFRICA	Iraq	3.5	Stolp, Simon J.
P122028	MA-Ouarzazate Concentrated Solar Power	MIDDLE EAST AND NORTH AFRICA	Morocco	665	Pariente-David, Silvia
P122153	Cameroon Mining Sector Technical Assistance Project	AFRICA	Cameroon	15	Pugachevsky, Alexandra
P122414	Private Sector Growth and Social Protection DPG	MIDDLE EAST AND NORTH AFRICA	Yemen, Republic of	70	Engelke, Wilfried

ADVICE ON PROCUREMENT SUCCESS

The following are a few tips to improve your chance to achieve success in World Bank-funded procurements.

- **Get into the Project Pipeline Early:** In the end, "its all personal." People tend to work with whom they want to work--approach the Bank staff personally; be well informed; and get to know the Bank staff and especially the in-country procurement decision-makers. Ultimately, building credibility and developing relationships will improve your chances of success.

- **Speak the Language of Development:** Remember that the Bank staff is more concerned with social goals and development impact than with the commercial aspects of deliverables and commercial implications.

- **Focus on Your Strengths:** Target opportunities carefully based on your company's regional experience or technical qualifications. The Bank and sovereign borrower want firms that have a strong reputation for reliability.

- **Learn the Procurement Process:** It is important to strictly follow the specifications of the tender and the bidding procedures. Review the bidding documents thoroughly and respond in compliance with the terms. Any deviances from the specifications could be used to disqualify your bid. In the event you must deviate from the specifications, inform both the executing agency in the host government and the Bank in writing and ask for guidance before the "Request for Clarifications" cut-off period.

- **Choose Local Partners Wisely:** Local information is power, and a local presence offers strong advantages. If you decide to bid through a local agent, the Bank will want to know who is actually performing the work.

Addressing the Electricity Access Gap

Background Paper for the World Bank Group Energy Strategy

June 2010

Executive Summary

Achieving universal access to electricity is one of the most important goals set for the energy sector by governments in the developing world. Electricity alone is not sufficient to spur economic growth, but it is certainly necessary. Access to electricity is particularly crucial to human development, as certain basic activities—such as lighting, refrigeration, running household appliances, and operating equipment—cannot easily be carried out by other forms of energy. Sustainable provision of electricity can free large amounts of time and labor and promote better health and education. Electrification can help achieve economic and social objectives.

Access Gap

The International Energy Agency (IEA) estimates that 1.5 billion people lacked access to electricity in 2008, more than one-fifth of the world's population. Some 85 percent of those without electricity live in rural areas, mainly in Sub-Saharan Africa and South Asia (Table E.1). There are large variations in electrification rates across and within regions. Transition economies and countries belonging to the Organisation for Economic Co-operation and Development (OECD) have virtually universal access. North Africa has an access rate of 99 percent, Latin America 93 percent, East Asia and the Pacific 90 percent, and the Middle East 89 percent. By contrast, South Asia has an electrification rate of 60 percent and Sub-Saharan Africa only 29 percent. The populations without electricity in these two regions account for 83 percent of the total world population without electricity. Sub-Saharan Africa has by far the lowest urban and rural access rates at 58 and 12 percent, respectively.

Table E.1: Access to Electricity in 2008

Region	**Population without electricity** millions	**Electrification rate,** %	**Urban electrification,** %	**Rural electrification,** %
Africa	589	40.0	66.8	22.7
North Africa	*2*	*98.9*	*99.6*	*98.2*
Sub-Saharan Africa	*587*	*28.5*	*57.5*	*11.9*
Developing Asia	809	77.2	93.5	67.2
China & East Asia	*195*	*90.2*	*96.2*	*85.5*
South Asia	*614*	*60.2*	*88.4*	*48.4*
Latin America	34	92.7	98.7	70.2
Middle East	21	89.1	98.5	70.6
Developing countries	**1,453**	**72.0**	**90.0**	**58.4**
Transition economies & OECD	**3**	**99.8**	**100.0**	**99.5**
World	**1,456**	**78.2**	**93.4**	**63.2**

Source: www.worldenergyoutlook.org/database_electricity/electricity_access_database.htm.

The relatively high average access rates in certain regions mask problems in some sub-

regions and individual countries. In East Asia, Myanmar has an overall access rate of only 13 percent, Timor-Leste 22 percent, Cambodia 24 percent, and the Democratic People's Republic of Korea 26 percent. In Sub-Saharan Africa, some countries have notably low rates: Burkina Faso, the Democratic Republic of Congo, Malawi, Mozambique, Tanzania, and Uganda have an overall access rate of about 10 percent, with rural access below 5 percent on average (IEA 2009).

Considerable progress has been made in some regions, but significant challenges remain. Achieving sustainable universal electricity access by 2030 may be very difficult in many countries. It is evident that an even stronger focus on electricity access is necessary to meet the needs of the poor and overcome this constraint on development.

Barriers to Electrification

There are several reasons why closing the electricity access gap remains an unfinished agenda.

- ***High costs of supplying rural and peri-urban households***. Most rural communities, as well as many peri-urban areas, are characterized by a low population density and a very high percentage of poor households. Demand for electricity is usually limited to residential and some agricultural consumers, and many households consume less than 30 kilowatt-hours (kWh) per month. The combination of these factors results in high costs of supply for each unit of electricity consumed.
- ***Lack of appropriate incentives***. The high costs of electricity supply in rural areas and the limited capacity of households to pay for the service make it difficult to attract investment in rural electrification. To do so requires a system of tariffs and subsidies that ensures sustainable cost recovery while minimizing price distortions. However, such a revenue-generation scheme is absent in many countries. All too often, tariff subsidies are designed to favor the large majority of consumers, including the well-off, while failing to provide utilities with incentives to invest in rural electrification. Such ill-designed tariff schemes are found is particularly in Sub-Saharan Africa, where subsidies applied to residential consumers are highly regressive (Foster and Briceño-Garmendia 2010).
- ***Weak implementing capacity***. Adequate design and effective implementation of a rural electrification program requires technical and managerial skills that are not always available. Countries committed to extending electricity access need to go through an initial period of strategy development and capacity building. This process may entail new or amended legislation, institutional strengthening, planning, and establishing technical standards and regulatory procedures tailored to the nature of rural electrification.
- ***Electricity generation shortage***. An obstacle to rural electrification in many countries with low access rates is insufficient generation capacity of the main electricity system. Most countries in South Asia are experiencing permanent load shedding. More than 30 countries in Sub-Saharan Africa suffer from systematic generation shortages (Foster and

Briceño-Garmendia 2010). It is unrealistic to expect these countries to make more than modest gains in increasing electricity access by means of grid extension until the capacity constraint is eased. Off-grid electrification has the advantage of not being affected by this capacity constraint.

- ***Population growth***. A further challenge in certain countries is the growth of their rural population. While the migration of population from rural areas to cities is accelerating in the developing world, the impacts of this trend on requirements for rural connections are offset by rising demand due to population growth: in low-income countries, rural population will increase in number to 2040 (UNPD 2007).

Providing sustainable electricity supply of acceptable quality to the 220 million urban residents who currently lack that service faces similar barriers to those in rural areas. These include low household income and low consumption levels, usually exacerbated by pricing and subsidy schemes that give few, if any, incentives to service providers to deliver good-quality supply. Illegal connections and electricity theft are common, as many households are not able to pay cost-reflective tariff rates. Theft is also significant in slums and areas with informal settlements, whose inhabitants often do not meet the legal requirements to become regular customers of the electricity company.

While the various obstacles described above are significant, they have not prevented the achievement of near-complete electrification in most countries in the transition economies, East Asia, Latin America, and the Middle East. However, the challenge is greater in low-income countries where electrification rates are usually much lower and institutions tend to be weaker.

Meeting the Challenge

The IEA estimates that, with appropriate policies, universal access to electricity could be achieved by 2030 with additional annual investment of $35 billion (in 2008 U.S. dollars). This amount is equivalent to 6 percent of the global power-sector investment projected in the Reference Scenario (in which no new policies affecting the energy sector are implemented after 2009), and the added investment would be needed mostly in Sub-Saharan Africa and South Asia (IEA 2009).

The World Bank estimated in 2006 that $860 billion would be needed to connect 600 million additional households to achieve universal access by 2030. These figures (Table E.2) are far above the current levels of investment. There is, therefore, a large financing gap that will be very difficult to be closed. It may not be realistic to expect that such a large amount would be mobilized during the next two decades, particularly in low-income countries where the electrification effort competes with other pressing social and infrastructure needs.

Table E.2: Investments Required for Universal Electricity Access by 2030

	Households requiring access (millions)	Required investments distribution	gen./trans.	total	annual
		($ billion)			
Sub-Saharan Africa	200	193	87	280	11
Middle East	40	58	20	78	3
South Asia	335	225	150	375	15
East Asia & Pacific	100	122	47	169	7
Latin America & Caribbean	50	60	26	86	3
Total	**595**	**587**	**271**	**858**	**34**

Source: Bank staff calculations.
Note: gen./trans. = generation/transmission.

The extension of the electricity distribution grid is often the cheapest way to reach new consumers and increase access rates. Off-grid technology options—mini-grids or individual systems—are appropriate to supply populations living in areas far from the existing grid and/or with demand too small to justify the fixed cost of extending the grid. While a purely economic assessment of grid extension or an off-grid solution in a specific case could easily be carried out, governments' decisions on expanding electrification are based on many country-specific political, social, and economic factors, including equitable regional development. In most countries, between 80 to 95 percent of the unserved communities are targeted to receive electricity supply through grid extension.

The increase in primary energy demand and the emissions of carbon dioxide associated with universal access would be very modest even if a significant shift to renewable energy is not achieved. The IEA estimates that bringing electricity to those without access, assuming no change in the fuel mix, would increase carbon dioxide (CO_2) emissions by 1.3 percent in 2030 (IEA 2009). In Africa, where the added generation would be the greatest, CO_2 emissions would increase by 13 percent in 2030. However, per capita emissions in Africa, at 1.4 metric tonnes, would still be about one-tenth of the average in the OECD in 2000 (IEA 2003).

The Way Forward

This paper draws from the documented cases of more than twenty countries in addressing the electricity access gap under different country circumstances, complemented by specific assessments of electrification efforts in Peru, Vietnam, and Sub-Saharan Africa.[1] Analyses of different country experiences help identify the factors contributing to successful electrification, distill lessons on good practice, and propose a way forward.

[1] Sources of case studies and lessons in electrification included *The Challenge of Rural Electrification: Strategies for Developing Countries* (Barnes 2007), *Designing Sustainable Off-Grid Rural Electrification Projects: Principles and Practices* (World Bank 2008a), and the draft report "Review of Experiences with Rural Electrification Agencies: Lessons from Africa" (Mostert 2008).

Successful as well as failed experiences worldwide show that a sustainable approach to electrification must take account of the following key aspects:

- **Sustained commitment of the government to supporting electrification as a priority development objective constitutes the most important feature of successful electrification programs**. A long-term commitment (at least 15 to 20 years) to electrification is a crucial step that frames the institutional, technical, economic and financial design and implementation of specific programs. If the commitment is absent, electrification programs will not move forward and will not be sustainable.
- **Although universal access makes sense from economic and equity perspectives, its financial viability is often uncertain.** The financial viability of electrification for those without access usually requires subsidies to cover part of its capital and/or operating costs, as many unconnected households cannot pay fully for the cost of electricity service. Whether and how to subsidize those who are not able to pay—through funds provided by taxpayers, cross-subsidies from better-off residential consumers or non-residential customers—is a country-specific issue for which there are no superior approaches applicable under all circumstances. It is up to each country to formulate its own strategy, including what priority to allocate to electrification and the type and level of subsidies provided, on the basis of its social, economic, and political conditions.
- **Extending access is particularly challenging for low-income countries with low electrification rates.** Once a country reaches a medium level of electrification and a certain income level—for example, 50 percent electrification and an average per capita income above $3,000 (valued at purchasing power parity)—it becomes easier to achieve universal access because there is an increasing critical mass of taxpayers and electricity consumers able to provide the funds needed to make electrification financially sustainable (Rysankova et al. 2009; Mostert 2008). The challenge is tougher in low-income countries where available resources and the numbers of consumers and taxpayers capable of contributing to subsidies tend to be limited. This situation is often aggravated by poorly performing utilities and regressive pricing policies subsidizing those who can afford to pay cost-reflective tariffs and contributing to systematic deterioration of the operational and financial state of the power sector and its institutional capacity. The consequence is a perverse situation, in which higher-income consumers receive benefits they do not need (through subsidized rates and/or unbilled consumption), leaving few or no resources to expand access. However, outstanding cases of success among low-income countries, as in Bangladesh and Vietnam, clearly illustrate that it is possible to overcome these difficulties through sustained government commitment to a long-term approach with arrangements and procedures that maximize efficiency in the design and implementation of policies, strategies, and programs aimed at expanding access, combined with actions to improve the existing tariff systems and subsidization schemes, as well as in the operational performance of utilities in charge of service provision.

- **There is no evidence for the superiority of any specific institutional model for electrification.** There are successful cases based on public, private, and cooperative models and schemes, as well as rural electrification agencies. A key element seems to be the definition and enforcement of an institutional framework consistent with the country's strengths and the nature of the problems faced, so as to use the limited resources available in an efficient manner. The management of the rural electrification programs requires the leadership of a strong entity, which could be either a distribution utility or a specially designated agency, with an efficient administration and the technical capacity to support the supply chain of contractors and small service providers. Countries have been able to succeed in their electrification efforts using diverse institutional approaches, provided that their programs and strategies include institutional, technical, economic, and financial design and implementation arrangements ensuring their sustainability; efficient execution; and financial and operational sustainability.

Framework Design: A Government Role

Appropriate approaches for institutional, technical, and economic design and implementation are crucial to carry out access expansion programs. Those approaches must cover tasks such as identification of the areas/population to be reached, definition of the components of the investment program (comprising technological options to be applied), methods for economic and financial evaluation (including criteria for assigning priorities), procedures for effective implementation and monitoring, and identification of sources of revenues needed to carry out investments and ensure service sustainability. For each task, it is necessary to set with clarity and apply with transparency the methods and procedures to be followed, including a precise definition of roles and responsibilities of stakeholders involved (government agencies, beneficiaries, incumbent service providers, contractors, non-governmental organizations, and so on). Public disclosure of all the phases in each specific program, from early design to effective execution, and active dissemination of this information can help ensure economic and financial viability of electrification efforts and to protect them against the risk of undue political pressures and discretionary decision-making. Because the cost of providing electricity to rural households is usually high, optimized design, including detailed planning, becomes all the more important. Failure to carry out any one of the above tasks may render a program unsustainable or leave it in the identification phase, as shown by several examples worldwide.

Planning of electricity access programs is a government role that has to be carried out by a capable, and usually centralized, government entity. Building such an institution often requires significant technical support and assistance, which donors are usually able to provide. Common features of successful rural electrification planning include

- a clearly established system to prioritize the areas to electrify and the projects to be selected;

- a long-term multiyear vision aimed at coordinating grid extension and off-grid efforts that should be supported by studies on the optimization of technology options and a grid/off-grid comparative economic analysis, and publicly disclosed market studies;
- a broad regional development approach that takes into account other conditions for rural development (access to education and health services, an adequate transport system, agricultural potential, access to markets, and the capacity of the local manufacturing industry); and
- the design and effective implementation of an institutional framework clearly establishing the roles and responsibilities of the public and private agents involved.

Whichever the approach adopted by a country, the planning of rural electrification programs and criteria for project selection in each program should be established upfront through clear, transparent, and publicly disclosed rules. Each country decides how to prioritize electrification investments among competing regions and/or projects on the basis of its own values, aiming to strike a balance between their economic efficiency and equity objectives. Countries engaged in the "last push" of electrification (e.g., Brazil, Chile) often give priority to the poorest regions. Conversely, countries in the early stages (e.g., Bangladesh) are naturally inclined to heed the financial viability of the investment.

The planning process may give consideration to the following:

- **Grid extension and off-grid options are not mutually exclusive and could be implemented in parallel and, under specific conditions, in sequence**. Grid extension is often the cheapest way to connect new users located not too far from existing networks and relatively easy to implement. Off-grid electrification—mini-grids or individual systems—is suitable in remote areas unlikely to be connected to the grid in the foreseeable future, provided that sustainable supply is guaranteed. In fact, all cases of success reviewed in this paper are based on extension of the grid, complemented, to varying degrees, by supply to isolated rural communities through mini-grids powered by diesel and/or mini-hydro generators. Individual systems, such as solar home systems, are suitable when grid extension and mini-grids are not viable and the expected consumption of households is very low. However, since they provide a limited amount of electricity, solar home systems should be considered an initial transitory, though sometimes long-lasting, step toward a mini-grid or integration into the national grid. Individual systems are likely to be a long-term transitory option for rural populations in countries that currently have very low access rates (mainly in Sub-Saharan Africa), as the service they provide can represent a clear improvement in the quality of life of beneficiaries, even without reaching service levels only achievable through grid connection.
- **Non-conventional renewable energy systems (solar, wind) can complement other sources (diesel, mini-hydro) in ensuring firm energy supply in mini-grids**. Scaling up the use of renewable energy in the energy supply mix of mini-grids should be promoted,

depending on effective availability of those resources and economic and financial viability of their exploitation.

- **Technology choices in off-grid electrification are not relevant in global environmental terms. Therefore, an off-grid technology-neutral approach should be encouraged**. A greater number of technology choices (including diesel mini-grids) is more likely to yield lower costs and a solution more suitable to the community's needs. Such an approach often requires removing regulatory barriers to specific technologies.
- **The planning process should assess the potential for productive uses of electricity and include measures for their promotion**. The experience of several countries, including Bangladesh and Thailand (Barnes 2007), suggests that promotion of and capacity building for productive uses of electricity in rural areas can increase the productivity of rural businesses, enable a more efficient use of the supply infrastructure, and improve the revenues of distribution companies, thereby enhancing the economics of electrification.
- **Local communities should be involved in the planning process of rural electrification programs**. The review of case studies shows clearly that rural electrification programs benefit greatly from local community participation. Involving local communities from the start can help improve the design (Peru, Vietnam), gain local support (Bangladesh), mobilize contributions in cash or in kind (Nepal, Thailand), and increase local ownership, contributing to operational sustainability. In fact, many of the successful experiences have made combined use of top-down and bottom-up initiatives.
- **Incorporating low-cost technologies in the planning and design stage can enable construction costs to be reduced by up to 20–30 percent without compromising service quality, contributing significantly to the pace and scope of electrification programs**. Many countries have been successful in reducing construction costs using technical standards adapted to rural demand patterns—frequently adopting low-cost single-phase distribution systems—and centralized procurement processes.
- **A greater emphasis on reducing the connection cost charged to the poor is a cost-effective way of increasing electricity access.** In several countries, the percentage of communities electrified exceeds by a large margin the percentage of households connected because few households can afford to pay the connection fee. For example, in Ethiopia only 35–40 percent of households are ready to connect (Maurer and Nonay 2009). The paradox is that while the individual connection represents a very small percentage of the total investment required to expand the service, the inability to pay for the connection keeps the access rate down. When the objective is universal access, this cost may have to be subsidized or favorable terms offered for payment.

While challenges in extending access are broadly common to all technologies, there are difficulties unique to off-grid electrification that may justify the use of other business

models. These difficulties are associated with the isolation of the communities to be reached and the need to deal with a variety of technologies, some of which are new to the power sector (solar photovoltaic systems, mini-grids based on diesel or mini/pico-hydropower). Off-grid electrification requires

- greater involvement of local communities and promotion of participation of local or regional small- and medium-size enterprises as contractors providing operation, maintenance, and customer services; and
- simplified regulations with flexible procedures, realistic and enforceable quality-of-service standards, and possible delegation of monitoring tasks to entities that are closer and/or better informed about the services being provided.

The foregoing discussion suggests that a rural electrification agency could be suitable for off-grid electrification.

Efficient Execution

Grid extension is the obvious technical option to achieve universal access in urban and peri-urban areas, and its sustainable implementation requires the joint effort of the government agency responsible for access, the regulator of the grid service, and the utility providing it. However, there are potentially two main obstacles. First, a tariff/subsidy system that provides funds needed to cover investment and operating costs of new consumers may be absent. Second, a regulatory system may fail to provide the distribution company with the incentives to supply consumers—especially those consuming little electricity and with a limited ability to pay—with good service quality. These factors create conditions that lead to illegal connections. The regularization of the electricity service can be addressed through good management practices supported by the application of smart technologies (such as theft-resistant grid designs) together with a consistent economic and service-quality regulation that allows efficient service providers to recover their total costs of supply and a fair return on their investments. However, it is necessary to complement these measures with a legal framework that legitimizes consumers, creates awareness about the value of electricity service, and promotes discipline in the use and payments.

Seeking broad participation in the execution of rural electrification projects can be an efficient way to extend access and mobilize additional financial resources. The provision of electricity in rural areas frequently entails the implementation of projects in remote areas where the distribution utilities have difficulties or it is more costly for them to reach. Programs that have sought broad participation in project execution have been able to mobilize local resources from the private sector, communities and regional governments, thereby enhancing the execution capacity of the utility. The mobilization of additional financing from local communities or private investors (often about 20–30 percent of the capital cost) also increases the leverage of the subsidized resources.

Competition for independently executed and operated concessions with output-based subsidies is useful in leveraging private financial resources and incorporating incentives for efficient implementation of rural projects. Open and transparent bidding processes are useful in reducing costs. Subsidy bidding, through innovative approaches, such as output-based aid, to maximize the number of connections for a given subsidy, is proving to be an effective way of leveraging significant private resources and delivering results.

Financial and Operational Sustainability: A Long-Term Utility Objective

The long-term sustainability of electricity service is essential. As with any other business, electricity distribution needs to be financially and operationally sustainable to be able to attract investors and meet the growing demand of customers. However, often this has been the Achilles heel of electrification. There are many reasons, ranging from pricing policies that kept tariffs below total costs of supply and the failure to create incentives for the provision of adequate customer service to, in remote off-grid systems, focusing mainly on the installation of equipment and largely disregarding operating and maintenance requirements.

A sustainable electricity service in rural and low-income neighborhoods requires a well-designed system of tariffs and subsidies. While a large part of capital costs is usually subsidized through special-purpose funds, many low-income households cannot pay the full cost of operation. Therefore, a system of tariffs and subsidies is required to complement—but not replace—the limited contribution of low-income consumers and ensure the sustainability of the service.

The financial sustainability of electricity service should be guaranteed mostly by the contribution from all consumers. In many middle-income countries this has been achieved through the use of cross-subsidies, that is, subsidies within the tariff system or specially targeted taxes through which higher-income consumers help cover the financial gap. However, in low-income countries with lower electrification rates, cross-subsidies have a limited use, made worse by regressive subsidy schemes. Nevertheless, the main source of revenue for ensuring the financial sustainability of the electricity service is the contribution of a critical mass of non-poor consumers. In this regard, prioritizing access in urban areas makes financial sense in low-income countries. The effectiveness of this approach could be strengthened if complemented with tariff systems and subsidization schemes that are well designed and implemented, and efficient operation of the utilities in charge of service provision.

The following steps can help achieve long-term financial sustainability:

- **A tariff/subsidy policy that recognizes the full cost recovery of an efficient service**. The utility should be rewarded with the subsidy payment upon confirmation that the service provided has been of adequate quality and quantity. Output-based aid mechanisms appear to be a good choice for implementing this principle.

- **A quality control mechanism to ensure that payments to service providers are effectively linked to the compliance with clearly defined quality-parameters for technical and costumer services**. This requires monitoring the quality of service to clients and defining and imposing penalties in cases of non-compliance. The absence of such a mechanism may introduce distortions into the incentive system, as regulated providers would tend to reduce investment and operating costs. The objective is to keep the focus on customer service. In remote areas, this monitoring role can be delegated to rural electrification agencies.
- **"Ring fencing" the finances of operation, maintenance, and customer services**. These should be completely separated from the investment/installation component.

It is up to each country to decide on the type and level of subsidies to be applied. However, subsidies should be well targeted and used for efficient investments and operating costs, and their design should try to minimize price distortions. Donors may prefer not to support subsidies for recurring costs, since these costs steadily grow as access is extended and are not time-bound. However, it is worth noting that subsidies on current/operating costs can be economically efficient and effective in addressing the country's equity objectives.

Low-income countries with low electrification rates face a more demanding challenge that calls for more efficient performance of the power sector and greater and sustained donor support. Given the magnitude of the electricity access challenge and, often, the limited institutional and financial resources available, it is imperative for low-income countries to minimize inefficiencies in the power sector. It is therefore more important to focus on improving the performance of utilities (technical, commercial, and financial) and implementing a well-designed tariff system, even if doing so might not lead to marked gains in access during the initial years. The larger financing gap and weaker capacity of low-income countries justifies a greater and well-coordinated role of donors that should be sustained over a relatively long period, as in the successful cases of the Lao PDR and Vietnam.

In Sub-Saharan Africa, it is essential to overcome the current power sector performance problems for an electrification effort to be sustainable. The challenge could prove insurmountable if electricity prices remain below costs in favor of the few who have access to electricity. The power sector in Sub-Saharan Africa is in the midst of a serious crisis, characterized by sub-optimal development of energy resources, high costs, under-pricing, and large inefficiencies in performance linked to governance constraints and a distorted set of incentives. In particular, under-pricing and regressive subsidies have become a serious impediment to providing electricity to rural areas and the urban poor. Also, technical and non-technical losses are, on average, very high (30 to 35 percent). It is obvious that any effort to extend access will not be sustainable if there is no progress in addressing these sector-wide problems. The inefficiencies of Sub-Saharan Africa utilities generate substantial costs to the economy that, on average, amount to 1.8 percent of gross domestic product (Eberhard et al. 2008).

Introduction

Achieving universal access to electricity is one of the most important goals set for the energy sector by governments in the developing world. Electricity alone is not sufficient to spur economic growth, but it is certainly necessary. Access to electricity is particularly crucial to human development, as certain basic activities—such as lighting, refrigeration, running household appliances, and operating equipment—cannot easily be carried out by other forms of energy. Sustainable provision of electricity can free large amounts of time and labor and promote better health and education. Electrification can make an important contribution toward achieving economic and social objectives.

Expanding access to electricity is particularly challenging in rural areas. The costs and benefits of rural electrification have been examined by two World Bank reports (ESMAP 2002; IEG 2008). The two reports arrive at similar conclusions, including the finding that rural electrification investments can generate sufficient benefits for the investment to be warranted from an economic standpoint.

The ESMAP study yielded a range for the willingness to pay of grid-connected households of \$0.10–0.40 per kilowatt-hour (kWh) for lighting and operating a television set alone. This figure, in its upper range, is in excess of the average long-run supply cost. If additional education and health benefits, the benefits associated with public goods (such as street lighting), and global benefits of reduced carbon dioxide (CO_2) emissions, where applicable, are included, the IEG report concludes that the monthly benefit for an average household consuming 30–40 kWh per month is about \$60. While this value is well above the long-run supply cost of a power system, it is worth noting that part of these benefits are not received in monetary terms and, hence, cannot be used as a measure of the ability to pay. In both studies off-grid schemes fare less well because they have higher costs and lower benefits.

The provision of electricity also has gender implications. Surveys indicate extensive benefits of electrification to women, including increased scope for evening activities, greater flexibility in organizing household activities as daylight is no longer a constraint, enhanced security, the potential for undertaking income-producing activities such as handicrafts, and reduction in time required for collecting water if electrification improves water supply (World Bank 2007a). Household electricity connections also help narrow long-standing gender gaps in rural areas. For example, the literacy gap has been found to be smaller in electrified villages in the Lao People’s Democratic Republic (Systems-Europe 2004).

The benefits of urban electrification overlap with those of rural electrification but not entirely. A workshop on electrification held in Brazil in 2005 (ESMAP 2007a) highlighted the following benefits of providing legal electricity in poor peri-urban and urban areas, some of which are different from the benefits of rural electrification:

- Improved household income from paying lower prices for legal electricity than for electricity sold by illegal operators

- Health benefits from reduction in indoor pollution and the use of boiled water
- Improved household security as a result of fewer fires and light at night
- Reduced violence on women
- Increase in educational levels
- Boost in social status, from social exclusion to social inclusion
- Security from street lighting
- More investments in housing improvements once the neighborhoods are secure.

This paper, prepared as a background paper to inform the forthcoming World Bank Group energy strategy, discusses the challenge of scaling up electricity access in developing countries, the efforts involved in achieving universal access, obstacles associated with access extension in rural and urban areas, technology and institutional options, the role of tariffs and subsidies, and elements of success in electrification programs. To that end, the paper draws from the experiences of more than twenty countries in addressing the electricity access gap under different country circumstances, distills lessons on good practices, and makes recommendations for a way forward. The review includes assessments found in the existing literature as well as three case studies carried out for the paper and described in the annexes.

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Mainstreaming Building Energy Efficiency Codes in Developing Countries

Global Experiences and Lessons from Early Adopters

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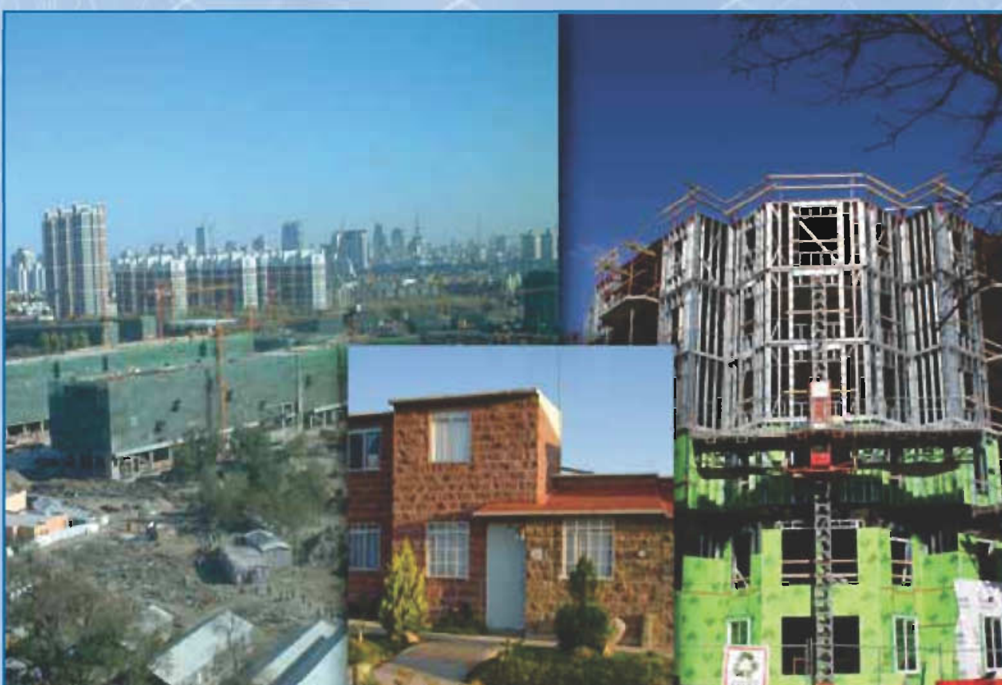

THE WORLD BANK

Executive Summary

Key Messages

Mandatory building energy efficiency codes (BEECs), when practically formulated, continuously updated, and actually enforced, are both effective and economic in overcoming persistent market barriers and delivering more energy-efficient buildings.

Price incentives and market information, such as charging users for energy services based on consumption and at cost-recovery prices and providing cost–benefit analysis of energy efficiency improvements, are essential to achieving energy savings afforded by BEEC-compliant buildings.

Adoption of enforceable BEECs is essential at the beginning of the process of transforming a country's construction sector toward delivering increasingly energy-efficient buildings. It is important for developing countries to start with realistic goals and to be conscious about the compliance cost implications. A practical and mandatory BEEC will initiate a positive feeding loop of enforcement, supply of technologies and materials, development of compliance capacity, and expanded enforcement that is reinforced over time.

Successful implementation of BEECs is a multifaceted and resource-intensive process that can take many years to achieve. Government interventions and persistency are critical to making energy efficiency a pillar of building construction. Enforcement failures may be directly attributed to the lack of indigenous technical, institutional, and market capacities. But the fundamental issue often is the lack of necessary government support and commitment to enable the development of those capacities. Such political and organizational mobilization has to be country-driven and supported by champions at local, regional, and national levels.

The main challenge for middle-income developing countries is the political commitment to adopting and enforcing broad-based BEEC compliance. The incremental cost financing for compliance with their BEECs can and should be largely borne by the building/home owners. International assistance should be primarily targeted at strengthening the enforcement and compliance infrastructure.

Development and implementation of BEECs in low- and lower-middle-income countries should be selective and initially targeted at the market segment where economic benefits are great and enforcement is most likely to succeed. In many of these countries, government oversight of urban building construction is often hampered by an inefficient or inadequate construction permit system and a large informal construction sector. International assistance will need to first focus on enabling the government to effectively manage the construction sector.

Greater attention should be given to development and implementation of appropriate BEECs in warm-climate developing countries. There is a large gap in the adoption of BEECs between cold-climate and warm-climate developing countries.

New approaches must be adopted to make carbon financing and other international clean technology financing mechanisms useful for mainstreaming BEECs in developing countries.

BEECs are legal requirements regulating the energy performance of building designs and their compliance during construction. Global experiences in the past 30 years or so indicate that enforcement of mandatory BEECs in new constructions and for the altered portions of existing buildings is an effective and necessary government policy intervention to reduce energy wastes during the life cycle of new buildings, mainly through reduced demand for active energy use in space heating, space cooling, ventilation, lighting, and service water heating. Most industrialized countries introduced BEECs in the late 1970s and have achieved broad-based enforcement. Many developing countries began to introduce BEECs in the 1990s. With a few exceptions the enforcement practices are still lacking, hindered by major institutional and economic barriers and limited by underdeveloped technical capacity.

This report summarizes the findings of an extensive literature survey of the implementation experiences of BEECs in developed countries (including a case study of California), as well as from case studies of four developing countries—China, Egypt, India, and Mexico. The report is written with the objective of informing the World Bank Group's energy and urban operations staff and its clients about the good practices from developed countries and emerging lessons from developing countries in the development and implementation of BEECs, focusing primarily on compliance enforcement in new building constructions. In developing countries, preventing the lock-in effect in new buildings are of greater and more urgent concern than energy efficiency retrofits in existing buildings in terms of impacts on future energy consumption.

Main Findings and Conclusions

There is an urgent need to assist fast-growing developing economies where active space heating and/or space cooling are normal practices and where the formal building construction sector plays a large role in urban development. The plug-in energy loads of buildings and related energy use and efficiency, such as those of appliances and office equipment, can be addressed over time and with flexibility and well-targeted policies and programs. But the built-in energy loads—such as those for space heating, space cooling, and lighting—are intrinsically related to building design and construction and are best (or must be) addressed during the design and construction process.

The urban building stock in developing countries is expected to more than double by 2030. Demand for energy services in buildings in developing countries will rise substantially in the next two decades, driven by population growth, urbanization, and increased and expanded wealth. Per capita energy use in buildings, indicative of the level of energy services, is much higher in developed countries than in developing countries. For example, per capita fuel and electricity uses in residential, commercial, and public-service buildings in Japan, one of the most efficient economies in the world, are about 2 and 15 times higher, respectively, than in China. Many of the large developing economies, such as China and India, are expected to grow significantly in wealth, driving up energy demand in buildings. The International Energy Agency projected that global final energy consumption in buildings would grow by 30 percent from 2007 to 2030 if prevailing practices and trends continued. Most of that increase is expected to come from fast-growing developing countries.

Increase of energy services in buildings in developing countries should and can be supported with dual attentions to shoring up energy supply and scaling up energy efficiency. The 2007 assessments of the Intergovernmental Panel on Climate Change (IPCC) find that (1) among all greenhouse gas–emitting sectors, buildings have the largest global mitigation potential in the period leading up to 2030, primarily through cost-effective energy efficiency measures; (2) substantial reductions in energy use in buildings can be achieved using mature technologies for energy efficiency that already exist widely and that have been successfully used; and (3) a significant portion of these savings can be achieved with reduced life-cycle costs. The last point is significant because many investments in energy efficiency in buildings are beneficial just for the sake of reducing energy costs. Climate change mitigation is a co-benefit.

Energy-efficient building design implemented together with efficient heating and cooling systems/equipment represents the largest technical potential for energy savings in residential, commercial, and public-service buildings. For developing countries, a key point of interest is to avoid locking in unduly high life-cycle energy cost when investing in new buildings and associated energy systems. In China's cold and severe cold regions, the heating load of apartment buildings can be reduced by at least 50 percent with cost-effective and readily available thermal insulation measures and high-performance windows, compared with traditional buildings. In India, new large commercial buildings can achieve nearly 40 percent energy savings cost-effectively, compared with existing national benchmark buildings.

Removing or lowering the market barriers to delivering of more energy-efficient buildings requires government intervention through mandatory BEECs. There have been no exceptions even in the most develop economies in the world. Mandatory BEECs compel the supply chain to begin to develop and produce more energy-efficient buildings and to integrate energy efficiency requirements into standard practices. The main market barriers, universal to all economies, include the following:

- *Issues with visibility and relevance of energy cost signals.* When building/home purchase decisions are made, the future costs of heating, cooling, and lighting services in buildings are relatively unimportant, since they generally are fairly small sums on a monthly basis. Moreover, subsidies in or unaccountability of energy costs existing in many countries can further blunt or even wipe out incentives to invest in energy efficiency. The complexity of buildings, mixed with occupant behavior, also makes it difficult to convey credible and clear-cut cost and benefit information.
- *Split incentives among key stakeholders.* In the building sector, investment decisions, including those regarding the energy features of a building, are usually made by developers and investors, not by those who will occupy the building later and be responsible for paying the energy bills. Consequently, energy efficiency features are not installed and occupants do not reap the benefits. Split incentives prevent basing investment decisions on life-cycle costs and, consequently, the realization of the benefits of energy efficiency investments.
- *Lack of information and knowledge.* Information about energy efficiency options is often incomplete, unavailable, expensive, and/or difficult to obtain or trust.

Even developers, design professionals, and contractors are not always aware of the energy efficiency technologies available. Even when they are aware of the technologies, they can be reluctant to take a chance on the technology and include it in building design. Many construction companies lack the knowledge to correctly apply new technologies.

- *Complexity of delivering more energy-efficient buildings.* The process of delivering a building project is among the most fragmented in delivering a commercial product. A project developer needs to deal with independently operated professional and trade units such as architects, engineers, and various construction and installation contractors, as well as suppliers of materials and components, and finally with code enforcement agencies to deliver a building that meets the needs of the clients/customers in safety, function, and energy efficiency. Since the interests of the market participants are often not aligned, the results are often suboptimal, at best.

Although not intentionally designed, the biggest shortcoming of BEECs is that they do little if anything to raise demand for more energy-efficient buildings or to encourage the supply chain to do more than what is necessary to comply with the requirements. Therefore, market incentives are also vital to encourage commercial deployment and market recognition of energy efficiency innovations that surpass the requirements of BEECs.

BEECs have become a widely adopted energy efficiency policy, much more so in cold-climate regions than in warm-climate regions. But there is a significant gap between the development of a BEEC and its actual implementation and enforcement, even in many developed countries. Most industrialized countries have mandatory BEECs. Among developing economies and economies in transition, BEECs are most prevalent in Eastern Europe and East Asia. Many of the countries in these regions are in cold climate zones and require heating. The most urbanized region in developing countries, Latin America and Caribbean, shows a lack of BEECs, and even where they exist, they are not implemented.

Systematic surveys on the compliance situation of BEECs are rare and results are hardly comparable. Given that the definition of compliance and the relative importance of different components vary significantly, the compliance figures revealed in partial data and anecdotes need to be taken with caution. But they do suggest that compliance and quality of enforcement is much less than perfect in most countries that enforce their BEECs. For example, compliance rates in the U.S. states range from low double digits to near 100 percent. Noncompliant items can be large or small. For example, a survey in Denmark in 2000 found that in 43 percent of the surveyed buildings insulation of internal pipes and water tanks had been missing. BEEC compliance is generally significantly poorer in developing countries where BEECs are either mandatory or voluntary. China is among a few developing countries where BEEC compliance has reached a significant level. National inspections conducted by the central government indicate that construction compliance in large Chinese cities has reached 80 percent in 2008.

Despite the somewhat disappointing compliance record, progress can be observed in terms of actual energy performance of buildings. New buildings today consume much less energy than older buildings from before the 1970s energy crisis. Both in Western Europe and the United States, energy efficiency improvements through BEECs since the 1970s amount to about 60 percent. But, it remains a fact that there is a substantial compliance gap almost everywhere and that energy savings and emission reductions are much smaller than they could be if BEECs were universally complied with. The extent of the lost opportunities is not known, since there is very little measuring of actual energy performance of buildings after construction is completed.

Most industrialized countries have managed to mainstream BEECs, meaning basic practice of energy efficient design and construction is a norm, not an exception. Although compliance still is suboptimal, there are good practices and important lessons among the pioneering countries in Europe and the United States:

- The countries and states that have done well in compliance are often those that have involved key stakeholders in the development of the BEEC, have devoted sufficient resources to support enforcement, made strong efforts to train and educate the key stakeholders in BEEC compliance, and adopted systematic approaches/procedures for enforcement. These countries and states also generally introduced complementary policies that provide incentives for supplying and acquiring energy-efficient buildings and information to all stakeholders about the benefits of such buildings.
- As BEECs become more complex and demanding, having a range of compliance options is important for most effectively addressing the varying needs of different building projects and preferences of different users. This movement from a fixed menu of options to flexible approaches that achieve the same overall energy savings is a natural evolution of BEEC enforcement in response to increasingly sophisticated buildings and diverse requirements of clients.
- Regularly updating the BEEC provides for incremental improvements and allows adjustments to improve implementation. The Energy Performance of Buildings Directive (EPBD) requires that BEECs in European Union (EU) member states are updated at least every five years. Many member states have shorter updating schedules. The national model BEECs and most state BEECs in the United States are updated every three years. Periodical updates provide a means to incrementally improve the stringency of the requirements and to incrementally expand the scope of the requirements, so that the changes are not so challenging to implement.
- A BEEC with more-uniform format and structure across various countries in an economically integrated region (EU) or within a large country (United States) facilitates performance evaluation and consistency in compliance. There will always be local differences in stringency based on climate, but having a more-uniform code format and structure allows designers and contractors, manufacturers, and suppliers to more easily identify the requirements for a particular locale regardless of which country or state it is in. It also has the benefit of spurring greater intraregional flow of technologies and innovations by leveling the playing field across previously segregated markets.

- Government must take the leadership role in implementing BEECs and promoting market transformation in building construction. Having the local government leadership will increase the likelihood that the BEEC is implemented in the city/county. Having the state and national government leaderships will increase the likelihood that the BEEC is implemented in the country. The EPBD of the EU is a good example of collective leadership.
- The public sector retains responsibility in most countries for enforcement of building codes in general and BEECs in particular. Faced with increasingly complex BEECs and insufficient resources for code enforcement at the local level, many countries have allowed contracting out some of the review and inspection duties that require substantial expertise to certified/accredited third parties. Since builders frequently hire third parties, mechanisms need to be put in place to ensure that third parties have incentives to carry out their work properly. These include spot checks by public-sector enforcement officials, loss of certification/licensing, penalties, and liability for mistakes.

The experiences from some of the early adopters of BEECs in developing countries are both sobering and encouraging. They reveal a broad spectrum of achievements and failures and underlying factors. China, India, Egypt, and Mexico are at different stages of implementing BEECs and have adopted varied approaches. Each represents an interesting case to inform the needs, challenges, and potential solutions to help mainstream BEECs in developing countries:

- ***China*** is on the verge of mainstreaming BEECs in new building construction in urban areas, thanks to national government leadership and persistent efforts over two decades. Even though compliance enforcement is still inconsistent and enforcement in medium and small cities is believed to be much more problematic than in large cities, implementation of BEECs is now commonly accepted practice in the construction sector, and incremental costs have been essentially internalized. The convergence of the following factors in the last five years or so has been important: (1) Improved and standardized system of BEEC compliance enforcement and procedures; (2) Broad-based capacity of the construction industry to meet the technical requirements of BEECs; (3) Widely available quality building materials and components for BEEC compliance; (4) Much increased ability to afford and willingness to pay for the incremental costs of BEEC compliance; and (5) Strengthened capacity and motivation of local governments to enforce BEECs.
- ***Egypt*** appears to face daunting challenges to implement two fairly sophisticated BEECs introduced in 2006 (residential buildings) and 2009 (commercial buildings) in an environment where basic building code requirements are not effectively enforced. Demand for and interest in energy efficiency is low because of widespread energy subsidies, especially for residential users. A new simplified general building law and the interest of the green building community, which is just now forming in Egypt, might provide a new motivation in constructing more-energy-efficient buildings. But strong national government leadership and support are needed for developing basic compliance and enforcement procedures required at the local level, in

training and capacity building of actors in the building supply chain, and in removing general energy subsidies.

- ***India***, currently focusing on implementing its first and initially voluntary Energy Conservation Building Code (ECBC) for large commercial buildings (2007), is making a big effort to put in place the measures and procedures and to develop the compliance capacity necessary to successfully implement the BEEC locally. By focusing on large new commercial buildings first, the efforts are likely to yield relatively quick progress in compliance if local governments pursue enforcement seriously. A BEEC for residential buildings would face substantial barriers, since many residential buildings are informally built and almost all residential electricity consumers are heavily subsidized. Providing some incentives for the developers of high-end large residential building complexes to apply the requirements of the ECBC might establish precedents for eventual adoption of a BEEC for residential buildings. In general, pushing for the wide adoption of and compliance with increasingly strict energy efficiency standards for appliances and lighting would substantially and cost-effectively curb the enormous growth in residential electricity consumption.
- ***Mexico*** developed a mandatory commercial building code in 2001 but has largely failed to implement it due to a lack of interest of local governments to incorporate its requirements into their local building regulations. More recently, the National Housing Agency CONAVI developed a national model regulation for residential construction, which contains sustainability requirements. Developers wanting to participate in CONAVI's subsidized low-income housing development program will have to satisfy those requirements. This represents an attractive approach to leverage market uptake of more energy efficient buildings. By engaging concerned state and municipal agencies, this federally supported program could pave the way for them to incorporate energy efficiency requirements into their building regulations and enforce compliance.

Expanding the scope and scaling up the implementation of BEECs in developing countries will be a gradual process requiring removal of relevant political, institutional, technical, and financial constraints. Each country will have to deal with its weaknesses in these areas with approaches that suit its own situation. Global experiences indicate that implementation of BEECs is likely to have more success in countries and localities where the construction sector is well managed in terms of government oversight of building safety and quality, the building supply chain is well established in terms of technical and engineering capacity, the market for commercially produced buildings is well developed, and there is broad and firm political commitment to improving energy efficiency. Weaknesses in these areas are often the main challenges to developing countries:

- *Challenge 1: Maintaining firm political commitment to energy efficiency.* Expanding modern energy supply infrastructure and energy access remains an investment priority in developing countries. That often leaves energy efficiency with little political attention. This is a critical mistake for countries of many income levels. Convincing the people of the importance of energy efficiency in national energy security provides a political mandate for the government to begin necessary steps to introduce and ramp up energy efficiency policies and programs as the specific needs are identified, such as the implementation of BEECs. The effect of such commitment has been well demonstrated in China and is emerging strongly in India.

- *Challenge 2: Establishing an effective government oversight system for building construction.* In many developing countries, government supervision of the construction sector for traditional safety requirements is ineffective due to the combination of overly complicated and costly permit application and review process and a lack of resources to handle the required due diligence. For these countries the implementation of BEECs is unlikely to succeed without improving the credibility and inclusiveness of the building permit and inspection system.
- *Challenge 3: Developing the compliance capacity of the building supply chain.* Compared with the prevailing commercial construction practices in many developing countries, implementing modern measures to reduce/minimize building heating, cooling, and lighting loads requires a host of new design skills and approaches, new or improved materials/components and construction techniques, as well as additional supervision, inspection, and testing/certification requirements.
- *Challenge 4: Financing incremental costs of more energy-efficient buildings.* Few decision makers and consumers in developing country would disagree that more energy-efficient and comfortable buildings are desirable. But with tight budget constraints for both governments and private citizens, tradeoffs often have to be made between more housing and more energy-efficient housing. Low-income countries often have priority in maximizing the floor area for a given amount of housing investment. Efforts to promote adoption of BEECs in developing countries should consider such constraints, together with the potential of tapping into international development financing mechanisms, including those addressing climate change mitigation and adaptation.

Recommendations and International Assistance Strategies

From the experience of developed countries and early adopters in developing countries, such as China, Mexico, and more recently Egypt and India, it is clear that government intervention and persistency are critical to making energy efficiency a pillar of building construction. Several conditions are particularly important to foster in the context of developing countries. International development institutions such as the World Bank could offer valuable assistance.

Expand and Strengthen the Political Support for Energy Efficiency

Engaging developing countries in substantive discussions of their energy efficiency strategies and actions requires convincing evidence and analysis of the costs and benefits of pursing those activities. Considering the importance given to energy efficiency by the international community, it is useful to conduct more in-depth and actionable sector-level energy efficiency assessments for developing countries. The multilateral development institutions (MDIs) or bilateral assistance agencies could help expand and strengthen the political support for energy efficiency by increasing the in-country knowledge and awareness of the critical issues, practical solutions, and cost–benefit implications of promoting energy efficiency in general and BEECs in particular.

Improve the Effectiveness of Government Supervision of Building Construction Sector

BEECs are a new dimension of government oversight of the building construction sector. But the elements of successful implementation are similar to those for implementing the general building codes. It is difficult to imagine good compliance enforcement of BEECs if the building construction in general is poorly managed and governed. Improving the effectiveness of government supervision of the building construction sector can be addressed as follows:

- *Simplify the building law, streamline the permit process, and make it more predictable and user-friendly*. Many countries have simplified their building laws. For example, Egypt reduced the number of procedures to be complied with and the time it takes to clear each procedure. However, many countries still show wide divergence locally (for example, states in India).
- *Strengthen the compliance and enforcement infrastructure by* committing requisite government resources and through involvement of nongovernment entities for regulatory due diligence. China has developed a government construction oversight system that depends heavily on third-party services for compliance of building codes, including BEECs. Mexico's building code compliance involves the private sector, as well.

Develop Technical and Engineering Capacity of the Building Supply Chain

The local availability of materials and equipment that can reliably fulfill the requirements of the BEEC is frequently an issue that can slow down the progress of BEEC implementation. Strong and persistent push for BEEC compliance sends unambiguous signals to local manufacturers about the type of products in demand. The next steps would involve the development of standards for materials and equipment, the set-up of testing facilities and protocols and the development of a certification system. It is advisable that international assistance involved in the demonstration projects during the first years after BEEC adoption to pay special attention to the potential and viability for domestically producing the materials and components for BEEC compliance, as well as market development strategies to increase the supply and assure the quality of such products domestically or at regional level (involving multiple countries).

In parallel, different trades in the building supply chain need to be trained and updated about compliance requirements and good practices in every phase of building construction. National-level commitment and involvement are important in resource-constrained developing countries for establishing and sustaining systematic programs to educate new generation of architects and engineers, train professionals, inform the public, disseminate good practices, and standardize procedures. International assistance programmed into such nationally orchestrated efforts is likely to have greater systemic impact and value. China has taken this approach and achieved good results under the leadership of the Ministry of Housing and Urban-Rural Development. Although currently focusing on large commercial buildings, India is embarking on a similar approach under the leadership of the Bureau of Energy Efficiency to help its building construction sector to adapt to the compliance requirements of the ECBC.

Capacity building for the building supply chain needs to extend to those tasked with enforcement of the building code, such as site plan and building design reviewers, and construction and equipment inspectors, whether they are government employees or third parties. Although China relies heavily on certified third parties for compliance enforcement, all city governments maintain a division in their construction department with responsibility of overseeing and supporting BEEC implementation. These similarly tasked government administrative units form a national network for the capacity building and market development assistance supporting the implementation of BEECs.

For developing countries that have made significant inroads in achieving compliance of their first BEECs, additional efforts should be made to support advanced energy efficiency programs. For BEECs to incrementally improve over time, it is desirable to have examples of greater energy efficiency. Utility incentive programs and green building programs can provide encouragement for progressive designers and developers to go beyond the minimum requirements in the current BEEC. Their experiences will then provide examples that can be pointed to as support for the next increment in the subsequent update to the BEEC.

Bridge the Gap in Incremental Cost Financing

Despite their life-cycle cost advantages, more energy-efficient buildings in general will cost more to build than their less-efficient counterparts. Mandatory BEECs essentially require home and building owners to pay for the incremental costs of more energy-efficient buildings. But this creates tension in developing countries where most of the population still is poor by developed country standards. In low-income countries, there are indeed hard tradeoffs between the current desire of having adequate housing and the long-term benefit of having energy-efficient housing. This constraint or dilemma can only be resolved with broad economic development and will take a long time for low-income countries.

There is a larger development issue in the pursuit of more energy-efficient buildings. In working toward the long-term goal of internalizing the incremental cost of more energy-efficient buildings, developing countries will need to rely on domestic policy reforms to set their economies on a sustained growth path. Directly relevant to energy efficiency promotion, it is essential that the policy reforms should lead to rationalization of energy pricing and billing, reserving subsidies for low-income households:

For mid-income developing countries, the incremental-cost financing for compliance with their BEECs can and should be largely borne by the building/home owners. China has essentially made that transition. The main issue for many middle-income developing countries is to finance the resource needs to enforcement broad-based BEEC compliance. User fees included in permit fees or payments of developers to third parties (as is the case in China) would be the usual sources. Utility DSM programs funded by energy efficiency surcharges could be useful in paying for capacity building, incentives, and monitoring and evaluation.

For low- and lower-middle income countries, the incremental costs of development and implementation of BEECs will be a major issue. It is thus important that these countries do what they can afford, targeting at the market segment where economic benefits are great and enforcement is most likely to succeed. India's initial effort on large commercial buildings is a good example. However, while smaller buildings may not be regulated until a later phase, it is important to begin addressing at least some of the energy consumption in all buildings in some manner. Initiatives may include supporting architecture designs (such as appropriate building orientation, shading, natural ventilation, and so on) that improve comfort without additional active energy service and energy efficiency measures that rely on locally available materials and benefit local manufacturing. A valuable companion program that could result in substantial benefits in the short to medium term would be the introduction and enforcement of energy efficiency standards for lighting and the most prevalent appliances.

The Global Environment Facility (GEF) has been a principal source of international financing for development and implementation of BEECs, focusing primarily on supporting national code development, pilots, and demonstrations. Carbon financing and other clean technology investment financing mechanisms could provide additional support for strengthening and broadening BEEC enforcement, and in particular encourage market-driven energy efficiency innovations from the private sector, such as the voluntary rating systems for green buildings.

Because of the complexity and high transaction cost of meeting the eligibility, monitoring and verification requirements of the Clean Development Mechanism (CDM), component based carbon-financing schemes focusing on the use of certified products, such as a special type of windows, insulation materials of certain defined physical properties, and/or more efficient air conditioners, could help spur the broader adoption of components of higher energy efficiency performance. Such an approach would be especially useful in new residential constructions where benefits of energy savings are highly disaggregated and building-level verification is much more difficult than large commercial buildings.

THE ENERGY SECTOR WITHIN THE ASIAN DEVELOPMENT BANK

ADB is an international development finance institution whose mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Headquartered in Manila, and established in 1966, ADB is owned and financed by its 67 members, of which 48 are from the region and 19 are from other parts of the globe.ADB's main partners are governments, the private sector, nongovernment organizations, development agencies, community-based organizations, and foundations.

ADB and Energy:

Under Strategy 2020, a long-term strategic framework adopted in 2008, ADB will follow three complementary strategic agendas: inclusive growth, environmentally sustainable growth, and regional integration. In pursuing its vision, ADB's main instruments comprise loans, technical assistance, grants, advice, and knowledge. Although most lending is in the public sector - and to governments - ADB also provides direct assistance to private enterprises of developing countries through equity investments, guarantees, and loans. In addition, its triple-A credit rating helps mobilize funds for development. As the region's partner in development, ADB is committed to a sustainable future and a cleaner environment for Asia and the Pacific. Over the past decade, ADB provided close to US$2 billion in assistance for energy and environment-related projects. ADB intends to mainstream the vision of clean development and climate change and expand its services to promoting sustainable growth in Asia and the Pacific. This includes involvement in new global and regional actions in response to the increasing concerns about climate change and rising energy prices.

To improve energy security and reduce air pollution and greenhouse gas emissions in its developing member countries, ADB established trust funds and launched initiatives to support capacity building, institutional development, and project development activities in the areas of renewable energy, energy efficiency, and climate change mitigation and adaptation

Transforming Energy Sector Operations

The Asian Development Bank (ADB) recognizes the crucial importance of supporting the Clean Energy Program to lower greenhouse gas emissions, while supporting inclusive economic growth needed to fight poverty.

ADB's Clean Energy Program is multipronged. It seeks to increase regional energy efficiency in energy, transport, and urban sectors; to adopt renewable energy sources; and to improve access to energy for the poor and remote regions—avoiding the use of traditional biomass. ADB uses a variety of instruments to support clean energy projects—including grant-funding for studies and project preparation, lending and risk enhancement, upfront purchase of certified emission credits, and where necessary, donor-funded grant components of investment to buy down the cost of projects.

Clean energy has become one of ADB's highest priorities, with over one fourth, or 27%, of the total approved loans in 2008 supporting projects with clean energy components that will reduce carbon dioxide (CO_2) emissions from a total of 7,103 megawatts (MW)-equivalent of power generation—comprising 4,703 MW installed power generation capacity, and 2,400 MW transmitted through hydro-dedicated transmission lines. Upon completion, these projects will abate more than 30 million tons of CO_2 per year ($MtCO_2$/yr), and will save about 6.9 million tons of oil equivalent per year (Mtoe/yr) through more efficient technology or renewable sources.

Approved projects in 2008 coupled investments with high impact and widescale energy efficiency and renewable energy projects meant to benefit large sections of ADB's developing member countries' (DMCs') populations. The lion's share of the clean energy investments, $896 million, went to supporting three major projects in the People's Republic of China (PRC), India and Viet Nam for municipal district energy infrastructure, dedicated power lines for renewable sources and a hydropower project, respectively. These projects will reduce the use of coal for heating supply, augment thermal generation with clean and sustainable hydropower, and will incorporate elements of social responsibility. For the PRC, ADB is supporting the nationwide development of municipal infrastructure using more efficient district energy systems. The project will address the financial constraints and technical and operational deficiencies that face municipalities attempting to implement these systems. The ultimate aim is to cover 100 million square meters with combined heat and power technologies.

The 23 clean energy projects approved in 2008 will be implemented in eight DMCs and will include a spectrum of clean technologies, one of these is an equity investment in a regional clean energy private fund that is open to more DMCs.

ADB also increased its support for solar power, which—though technically proven—has yet to be commercially available. Wider application will accelerate technology development, lower project risks and equipment manufacturing costs, and allow its use for distributed power supply when prices drop with economies of scale. ADB funded preparatory work for a 50 MW solar thermal power facility in Rajasthan, India. In Bhutan, solar power will pilot a combination of emerging technologies to meet the power needs of 119 public facilities in remote mountainous regions, particularly schools, health clinics, and monasteries. The project will use off-grid solar photovoltaic systems and introduce white-light emitting diodes (LEDs) and double-layered capacitors for storage of the small amount of energy needed by the LEDs.

Wind power farms are being built across the region with ADB support. Two wind farm projects in India are constructing over 550 wind turbines, resulting in about 180 MW added to the country's power mix. A wind power project in Inner Mongolia, PRC will save 140,000 tons of CO_2 annually. ADB is also supporting Viet Nam's efforts for hybrid wind-diesel power stations to supply island districts and rural communes.

Hydropower continued to be a source of renewable energy in 2008, with large hydropower projects supplying hundreds of megawatts to rural areas. ADB invested in the hydropower system in the Vu Gia-Thu Bon river basin in Viet Nam, which will produce 156 MW of electricity.

Biogas digesters, of the small domestic variety, were widely distributed in 38 provinces in Viet Nam through the support of ADB. Sixty thousand of these domestic biogas digesters went directly to small livestock farmers in rural areas. Powered by livestock waste, the digesters provide rural farmers with access to energy, and sequester the waste safely, reducing the health hazards.

The steep increase in energy use in the region has led to a focus on mitigating greenhouse gas emissions in the transport sector. In PRC, ADB is backing energy efficiency improvements in the railway sector, which will see common diesel-powered trains upgraded and their fuel efficiency improved.

Solar panels will power distant stations and rail switches. These technological improvements are slated to reduce emissions by more than 1.3 $MtCO_2$/ yr, and replication of the measures in other parts of the PRC railway network will result in even larger reductions. Support is also in place for the development of a rapid mass transit system in Lahore, Pakistan, which is expected to reduce vehicular carbon emissions.

Improving energy efficiency is a key component of clean energy. In Pakistan, one investment aims to enhance the efficiency of the overall power distribution system. Aside from adding capacity of circuits and transformers to deliver power reliably, the distribution network will be refurbished to cut losses by bringing the system up to global efficiency standards.

ADB also supported capacity building, particularly in the Pacific region, where traditional energy is commonly used for everyday needs such as cooking and heating. Capacity and awareness building among government agencies, households, and private sector will help identify opportunities for clean energy technology, e.g., LEDs, wind, home-scale solar, bio-diesel, and wave or hydro power. In a similar initiative in Sri Lanka, the state's sustainable energy authority is receiving assistance for preparing energy-efficient building codes and tax relief for the Clean Energy Program investors.

At the consumer level, ADB has started several projects that deal with demand-side energy efficiency for the first time. Aside from introducing LEDs and improving efficiency of transport systems, ADB supported the large-scale adoption of compact fluorescent lamps. ADB approved the Philippine Energy Efficiency Project that will distribute 13 million compact fluorescent lamps to homeowners and businesses over 2 years. The government has already announced a ban on the low efficiency incandescent lamps. The expected benefits to this project are impressive—annual savings up to $100 million in fuel costs and deferral of $450 million in new power generation capacity. The project has high replicability in other DMCs and efforts are underway in Pakistan and Viet Nam to adapt the project design to specific country conditions.

The response to climate change through Clean Energy Program includes knowledge transfer and building the capabilities of ADB through the recruitment of experts and participation of staff in both internal and external events.

In keeping with the constant flow of information, ADB has continued to produce knowledge products on clean energy, such as a case study on the PRC's efforts towards greater energy efficiency, and quarterly newsletters from the Energy Efficiency Initiative. ADB's constant activities in the field and the new knowledge gained are all recorded and are accessible through ADB's clean energy website.
ADB reaches out to practitioners, experts, and organizations on the forefront of the climate change fight through events such as the Asia Clean Energy Forum, the Clean Energy Expo Asia, and the Clean Energy Expo China. The Asia Clean Energy Forum is jointly organized with the United States Agency for International Development and supported by several bilateral donors. Begun in 2005, the Asia Clean Energy Forum is the largest and most widely attended forum on clean energy in Asia, attracting the participation of governments, civil society organizations, development partners, manufacturers, energy utilities, and consulting firms. In 2009, the forum was preceded by a high-level dialogue that brought together top policy makers to catalyze national and regional actions for the global response to climate change.

Support for the clean energy program continues in 2009, with 44 public and private sector projects with clean energy components amounting to $3.3 billion currently in the pipeline. Six projects with $478.5 million in clean energy components have been approved as of May 2009. About one third of the remaining projects are expected to be approved within the year, bringing approvals for 2009 to around $1.5 billion.

With high levels of confidence for clean energy investments, ADB's newly approved 2009 Energy Policy targets the annual lending for related programs to $2 billion by 2013.

THE ENERGY SECTOR WITHIN THE INTER-AMERICAN DEVELOPMENT BANK

The Inter-American Development Bank, the oldest and largest regional bank in the world, is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. Its loans and grants help finance development projects and support strategies to reduce poverty, expand growth, increase trade and investment, and promote regional integration, private sector development and modernization of the state..

The IDB obtains its own financial resources from its 47 member countries, borrowings on the financial markets, trust funds that it administers, and through co-financing ventures. The IDB's debt rating is AAA, the highest available. The IDB Group is composed of the IDB, the Inter-American Investment Corporation and the Multilateral Investment Fund. The IIC focuses on support for small and medium-sized businesses, while the MIF promotes private sector growth through grants and investments. The IDB is headquartered in Washington, D.C. and has Country Offices in all 26 of its member countries in Latin America and the Caribbean, as well as in Paris and Tokyo.

IDB and energy

The countries of the Latin America and Caribbean region (LAC) face growing demands for energy at a time of rising energy prices and tensions over reliability of supply. Ensuring affordable and reliable sources of energy is at the core of the LAC development agenda. In addition, the impacts of uncontrolled climate change threaten to undermine the regions economic and social well being, increasing its vulnerability to climate risks such as natural disasters, disruptions of agriculture, and loss of biodiversity.

The intent of IDBs Sustainable Energy and Climate Change Initiative (SECCI), approved by IDB Board in March of 2007, is to support the LAC region in its urgent challenge to find economically and environmentally sound energy options. Its core objectives are to expand the development and use of renewable energy sources, energy efficiency technologies and practices, and carbon finance in the region, as well as to promote and finance climate change adaptation strategies that reduce the regions climate vulnerability.

SECCI seeks to meet these core objectives by:

• Closing gaps in the financing of renewable energy and energy efficiency (RE/EE) in LAC by upscaling Bank investments;
• Integrating policy reform and removal of institutional barriers with innovative policy and project financing for market transformation;
• Mainstreaming sustainable energy investment across sectors and refining financing tools;
• Accessing the carbon finance market to the fullest extent;

• Addressing adaptation needs in existing capital assets in LAC- and IDB-financed projects as part of natural disaster risk management;
• Collaborating and forming new partnerships with the public and private sectors in LAC, donor agencies, and other financial institutions.

THE ENERGY SECTOR WITHIN AFRICAN DEVELOPMENT BANK

The African Development Bank (AfDB) Group's mission is to help reduce poverty, improve living conditions for Africans and mobilize resources for the continent's economic and social development. With this objective in mind, the institution aims at assisting African countries – individually and collectively - in their efforts to achieve sustainable economic development and social progress. Combating poverty is at the heart of the continent's efforts to attain sustainable economic growth. To this end, the Bank seeks to stimulate and mobilize internal and external resources to promote investments as well as provide its regional member countries with technical and financial assistance.

AfDB and Energy:

Between 1967 and 2007, 12% of Bank Group approvals amounting to UA 3 billion were allocated to the energy sector, with about 90% of this amount going to power supply. At the national level, support was provided to electrification programmes in countries such as Benin, Burkina, Cameroon, Ethiopia, Guinea, Mali, Mozambique, Senegal and Tunisia.

Rural electrification has been the dominant objective under the ADF window, followed by multi-national grid interconnections and renewable energy development. In collaboration with the World Bank, the AfDB has also supported energy sector reforms in a number of countries, including Senegal.

Under the ADB window, large-scale power generation projects have tended to dominate, followed by modern fuels (refined petroleum products and gas) and power transmission and distribution, in that order.

African countries' energy development strategy geared to the goal of access-for-all should be anchored on three pillars:

* maximize clean energy options
* emphasize energy efficiency
* participate more effectively in international carbon credit markets.

Increasing energy access: a priority

Increasing energy access is a priority for Africa. A large segment of the continent's population, especially in Sub-Sahara Africa and in the rural areas of the continent's middle-income countries (MICs), lives in conditions of acute 'energy poverty'. Foraging for fuel for domestic uses takes up a disproportionate share of productive and leisure time mostly of women and children. And, it is a back-breaking activity. Health impairment and an unacceptable high rate of mortality in the order of 400,000 deaths from respiratory diseases per year are linked to exposure to indoor pollution from 'dirty fuels' in poorly ventilated dwellings.

The AfDB estimates that, even with expanded access to electricity for more than 90% of the continent's rural population by 2030, rural demand for electricity will account for only about 10% of total power generation. The rest will come from urban areas where the energy-intensive industry and service sectors are predominantly located. Taking into account a wider range of energy sources, including biomass, rural populations are expected to exert about 20-25% of total final energy consumption demand by 2030. Thus, rural energy demand is not overwhelming.

Nevertheless, AfDB’s experience is that conventional approaches to rural electrification are not cost effective means to attaining the goal of access-for-all to electricity in rural areas. Geographical realities suggest that decentralized, autonomous energy infrastructure development harnessing local resources – most often, renewable – is an option to increasing rural energy access.

On the other hand, integrated national power grids and fuel bulk supply systems interconnected at the three regional or multi-country levels are the most cost-effective and reliable means to meeting the energy needs of populations and economic sectors.

Africa’s policy-makers therefore face the challenge of simultaneously having to meet the two types of growing energy demand within the context of robust economic growth, social transformation, and poverty reduction. One dimension of the challenge is mastering cost-effective technologies for sustainable exploitation of energy resources be it at the micro or macro levels. Another dimension concerns the mobilization of investment resources and financial sustainability considerations. Yet, a third dimension concerns the appropriate institutional arrangements to support rural decentralized energy systems and the level of integration between rural decentralized energy supply systems as well as nationally and regionally integrated energy supply systems.