Formal Report 324/06

Proceedings of the International Grid-Connected Renewable Energy Policy Forum

August 2006

ESMAP

Energy Sector Management Assistance Program (ESMAP)

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Purpose

The Energy Sector Management Assistance Program (ESMAP) is a global technical assistance partnership administered by the World Bank and sponsored by bi-lateral official donors, since 1983. ESMAP's mission is to promote the role of energy in poverty reduction and economic growth in an environmentally responsible manner. Its work applies to low-income, emerging, and transition economies and contributes to the achievement of internationally agreed development goals. ESMAP interventions are knowledge products including free technical assistance, specific studies, advisory services, pilot projects, knowledge generation and dissemination, trainings, workshops and seminars, conferences and round-tables, and publications. ESMAP work is focused on four key thematic programs: energy security, renewable energy, energy-poverty and market efficiency and governance.

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ESMAP
c/o Energy and Water Department
The World Bank Group
1818 H Street, NW
Washington, D.C. 20433, U.S.A.
Tel.: 202.458.2321
Fax: 202.522.3018

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Acknowledgments

This report presents the proceedings of the International Grid-Connected Renewable Energy Policy Forum which was held on February 1-3, 2006, in Mexico City, Mexico. The Forum was hosted by the Mexico Ministry of Energy (SENER) in cooperation with the Global Environment Facility (GEF), the World Bank, the Energy Sector Management Assistance Program (ESMAP), and Global Wind Energy Council (GWEC). This event was a follow-up meeting to discuss issues raised and commitments made by Forum sponsors at the World Summit on Sustainable Development (WSSD) and the Bonn International Renewable Energies Conference. At these prior events, linkages between energy and development were established and the important role of Renewable Energy (RE) was highlighted with a "sense of urgency".

SENER's leadership resulted in the success of this event. Particular recognition is accorded to His Excellency Minister Fernando Canales Clariond; Lic. Carlos Garza Ibarra, Deputy Secretary for Energy Policy and Planning; and Dr. Juan Mata, Director General for Environment, Technology Development, and Research. Sincere appreciation is bestowed for the excellent support received from these individuals, and SENER staff overall, in the planning and execution of the Forum.

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From the GEF, Ms. Christine Woerlen provided significant input and contributions in the design and implementation of the Forum. The meeting

benefited from the active participation of Mr. Richard Hosier, Team Leader, Climate and Chemicals, the GEF.

The organization team for the Forum included: Mr. Claudio Alatorre Frenk in Mexico; Ms. Judy Siegel and Ms. Maria H. Rivera-Ramirez of the Energy and Security Group; Mr. Daniel Farchy, Junior Professional Associate, Finance, Private Sector and Infrastructure Department, World Bank LAC; and Ms. Sandra de la Cruz, SDO-events. Special thanks are also due to Ms. Marjorie K. Araya for coordinating the publication of this document. The presentations provided during the Forum have been compiled onto a CD which accompanies this report. They are also available on the Forum Website at http://www.gridre.org.

List of Acronyms and Abbreviations

ASTAE	Asia Sustainable and Alternative Energy Program
BIREC2005	Beijing International Renewable Energy Conference 2005
BNDES	Brazil National Development Bank
CDM	Clean Development Mechanism
CEARE	Center of Studies of the Energy Regulatory Activities
CER	Certified Emission Reductions
CFC	Chloro-Fluoro-Carbons
CFE	Federal Electricity Commission
CO_2	Carbon Dioxide
CSD	Commission on Sustainable Development
CSP	Concentrated Solar Power
DEG	Deutsche Investitions-und Entwicklungs-gesellschaft'
ECAs	Export Credit Agencies
ECN	Energy Research Center of the Netherlands
EPSRA	Electric Power Sector Reform Act
ESMAP	Energy Sector Management Assistance Program
ESPs	Energy Service Providers
EU	European Union
EVN	Electricity of Vietnam
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GNESD	Global Network on Energy for Sustainable Development
GTZ	German Technical Cooperation
GVEP	Global Village Energy Partnership
GW	Gigawatt
GWEC	Global Wind Energy Council
GWh	Gigawatt hour
IAP	International Action Plan
IDAE	Instituto para la Diversificación y Ahorro de la Energía
IEA	International Energy Agency
IFC	International Finance Corporation
IIE	Mexican Electric Research Institute

IPP	Independent Power Producer
IREDA	Indian Renewable Energy Development Agency
ISO	Independent System Operator
JI	Joint Implementation
KfW	Kreditanstalt für Wiederaufbau
kWh	Kilowatt hour
LAC	Latin America and Caribbean
LFC	Luz y Fuerza del Centro
MDG	Millennium Development Goals
MNES	Ministry of Non Conventional Energy Sources
MPR	Market Price Referent
MSP	Medium-Sized Project
MW	Megawatt
MWh	Megawatt hour
NEP	National Energy Policy
NEPP	National Electricity Power Policy
NREA	New and Renewable Energy Authority
OECD	Organization for Economic Cooperation and Development
O&M	Operation and Maintenance
PER	Renewable Energy Plan
PPA	Power Purchase Agreement
PROINFA	Brazilian Renewable Energy Incentive Program
PTC	Production Tax Credit
PUC	Public Utility Commission
PV	Photovoltaic
R&D	Research and Development
RD&D	Research, Development, and Demonstration
RE	Renewable Energy
RE Act	Renewable Energy Sources Act
RECs	Renewable Energy Credits
REMP	Renewable Energy Master Plan
REN21	Renewable Energy Network for the 21st Century
Renewables2004	Bonn International Renewable Energies Conference
REP	Rural Electrification Policy
RO	Renewable Obligation
ROCs	Renewable Obligation Certificates
RPDRES	Russian Program for Development of Renewable Energy Sources
RPS	Renewable Portfolio Standards
SBC	Systems Benefit Charge
SEBs	State Electricity Boards
SEFI	Sustainable Energy Finance Initiative
SENER	Mexico Ministry of Energy
SPRU	Science and Technology Research
SWERA	Solar and Wind Energy Research Assessment Program
UK	United Kingdom

UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
US	United States
USDOE	United States Department of Energy
VAT	Value Added Tax
VND	Vietnam Dollar
WEC	World Energy Council
WEO	World Energy Outlook
WSSD	World Summit on Sustainable Development

Executive Summary

Overview

From February 1-3, 2006, approximately 300 participants from 35 developing and industrialized countries from around the world gathered in Mexico City, Mexico, for the International Grid-Connected Renewable Energy Policy Forum.

The purpose of the Forum was to facilitate increased use of grid-connected RE in the developing world. Specific objectives were three-fold:

- To exchange experience and lessons learned on renewable-friendly power sector policies between countries with successful policies—both industrialized and developing—and countries currently in the process of developing or considering new Renewable Energy (RE) policy frameworks.
- To present issues, offer solutions, share lessons learned, and discuss good practices based on country-specific case studies and cross-cutting issues and themes.
- To offer a platform for discussing collaborative opportunities and exploring follow-on activities.

The interactive Forum was designed to focus on four core topics: 1) incorporation of RE in power sector frameworks; 2) economic valuation of RE; 3) RE policy instruments; and 4) private sector investment in RE. The Forum presented issues and offered solutions, lessons learned, best practices, and country-specific case studies in both plenary sessions and break-out discussions. Appendix I provides the Forum agenda and Appendix II the participant list.

Overall, participants commented that the Forum was timely and informative. The presentations were of high quality and provided useful information in a concise format. The various policy models applied by industrialized nations over the last 20 years were introduced and discussed in the context of their ability to achieve RE market growth and provide other benefits. Several developing countries presented their experiences and expectations in establishing RE as part of their overall energy strategies. During the sessions, decision-makers from both developing and industrialized countries were able to raise and discuss questions and issues, and establish important contacts. There was strong interest in and commitment to follow-on by the participants and for scaling-up of grid-connected RE in their countries. Resources were identified to follow through on these country commitments and to build upon the momentum generated by the Forum.

Key Findings and Lessons Learned

In the course of the three-day meeting speakers and participants attempted to address the challenge of scaling up the use of RE for grid power supply. They began by noting the three key **market drivers** for RE:

- First, advancing *energy security*, by diversifying a country's energy mix and reducing the impact of fossil fuel price uncertainty.
- Second, helping to ensure a *cleaner environment* and reducing carbon dioxide and other harmful emissions.
- Third, stimulating *economic development*, to include developing markets, building industries, generating jobs and incomes, and reducing poverty. Several speakers noted that RE is good business, can be profitable, and is able to boost economies in the short, medium, and long term.

Among the **general lessons learned** were the following:

- *One-sixth of global energy comes from RE, yet this is primarily traditional biomass and hydropower*. Other Renewable Energy Technologies (RETs) are growing rapidly, though they are starting from a small installed base. More aggressive use of policies to address market failures and promote "no regrets" solutions such as renewables can help address security issues and provide a pathway for climate change mitigation.
- *RE is making a difference*. Forty-eight countries have RE policies in place and the list is growing. However, the impact of these policies in terms of installations is highly concentrated in only five countries. Notably, in these countries it was policy interventions, not resource availability, that drove the markets.
- *RE "technology push" options are not appropriate*. There is a need to advance solutions matched to the local resource base and market conditions. All RE options should be considered, including large-scale hydropower.
- In the case of developing countries, *the focus must be on commercial technologies* with proven performance, as they cannot afford to be a test bed for unproven options.
- Analysis of natural resources and power generation portfolios with appropriate risk adjustment techniques often leads to the acknowledgment that *in most countries there are economically and financially cost-effective niches for RE*.

With respect to **incorporation of RE in power sector frameworks**:

- Industrialized countries have shown that deregulating the power sector can expand service, attract private investment, and bring independent power producers (IPPs) to the market. An effective legal framework can establish policies to promote RE. It is important that *RE be considered early in the design of power sector reforms,* not after they have taken place.
- *Power sector structures influence the approach to RE market penetration*. Vertically integrated utilities provide economies of scale, but the amount of RE capacity is determined by a monopoly that may be resistant to change, and there is little risk sensitivity. In an unbundled system, competition exists, the rules are set by the market allowing for more flexibility, increased opportunities exist for private generators though they may need special treatment, and each actor manages his/her own risk. In both cases long-term contracts are important and "cookie cutter" solutions should be avoided.

With respect of **economic valuation of RE**:

- *Many RETs are cost competitive today with conventional options. However, in other instances, even if RE is the economically viable option, technical, institutional, financing and market barriers hinder large-scale deployment.* Under these circumstances, policies, market development, capacity building and other measures can help address these barriers.

- Further, *if the true economic value of RE is captured, a broader range of cost competitive options emerge. Mechanisms for capturing the true economic value* include more effective planning tools that recognize the importance of generation portfolio diversification, the role of RE as a hedge against fuel price volatility, and environmental and health externalities. Increasing access to credible renewable resource information is also crucial.

- *There is a lack of a level playing field between renewable and conventional energy due to the existing subsidies on fossil fuels*. Removal of existing market distortions can be an effective policy instrument to promote investment in economically viable RETs, however, strong political will and commitment are required.

- *Grid integration is the next major technical and policy issue that must be addressed*, particularly as renewable technologies account for a growing share of total generation.

With regard **to RE policy instruments**:

- *Twenty-five years of experience has demonstrated clear factors for successful RE policies*. They must be long-term and consistent; have a secure and predictable payment mechanism; provide fair and open grid access; possess strong governance conditions, clear administration procedures, and low transaction costs; have strong public acceptance; and enforcement is key. Countries should start simply in the design of energy policies, and always remember—"the devil is in the details".

- Three major RE policy options are operating in the marketplace, and clear differences were highlighted. These included feed-in laws, renewable portfolio standards, and tendering. A review of the various policy options is provided in the summary table on the following page.

  - *Feed-in laws* produce high penetration rates in a short period, create local manufacturing opportunities, provide strong incentives for private investments, and can be cost effective if the tariff is periodically and wisely adjusted. To date, feed-in laws have demonstrated the highest installation rates for RE and are considered most desirable by investors given their price certainty.

  - *Renewable Portfolio Standards* (RPS) are good at reducing cost and price with competitive bidding, yet tend to favor least-cost technologies and established industry players unless separate technology targets or tenders are put in place. They are also more complex to design and administer than feed-in laws.

  - *Tendering* policies are effective at reducing cost, but need to have a mechanism to reduce price over time; ensuring that signed contracts are realized is a key challenge.

- The types of *instruments selected should be based on specific goals and objectives, country conditions, and power sector structure*. There is no single solution; the effectiveness of a particular policy will rely on how well it is designed and enforced.

With respect to **financial incentive policies and financing mechanisms**:

- A *range of financial incentives exist to level the playing field for RE investments*. These can decrease upfront capital costs through subsidies, reduce capital/operating costs through tax credits, improve revenue streams with carbon credits, and provide financial support via loans and guarantees.

- *Experience demonstrates that output-based incentives are generally preferable to investment-based incentives for grid-connected*

RE Policy Review

	Quantity of RE Development	Cost/Price Reduction	Resource Diversity	Market Sustainability	Local Industry Development	Investor Certainty	Simplicity
Feed-In Laws	Large amounts RE in short time	Cost efficient if the tariff is periodically and wisely adjusted	Excellent	Technically & economically sustainable	Excellent	Can reduce investor risk with price guarantee & PPA	Most simple to design, administer, enforce, contract
RPS	If enforced, can meet realistic targets	RPS and tendering best at reducing cost & price with competitive bidding	Favor least-cost technologies	Technically & economically sustainable	Favor least-cost technologies & established industry players	Lack of price certainty difficult for investors/ PPA can reduce risk	More complex to design & administer & complex for generators
Tendering	Related only to quantity RE established by process	Good at reducing cost	Favor least-cost technologies	Tied to resource planning process; sustainable if planning supported, stable funding	Favor least-cost technologies & established industry players	Can provide certainty if well designed (more risk than feed-in)	More complex than Feed-in, simpler than RPS

Source: Dr. Jan Hamrin, President, Center for Resource Solutions
RE = Renewable Energy; PPA = Power Purchase Agreement

RE. This is because the investment-based mechanisms do not necessarily provide incentives to generate electricity or maintain the performance of the RE plants once they are installed, while the output-based incentives promote the desired outcome—generation of electricity from RE.

- The most frequent approaches for *covering the incremental cost of RE* and the funding of the various policy measures were passing the costs onto consumers through a systems benefits charge (SBC), imposing a carbon tax on fossil fuel, and setting up a dedicated fund financed directly by the Government or with donor support.

- *Though funding sources exist for RE through developing country governments, local financial institutions, multilateral and bilateral organizations, dedicated funds, and others, gaps remain*. Attention is needed in the areas of long-term financing, project development and seed capital mobilization, covering debt/ equity gaps, and risk mitigation instruments. Carbon finance can play a significant role as the market evolves.

- *Various models of public-private partnership for financing RE exist*. In general, public sector funds must be highly targeted to catalyze, not displace, private capital. Public funds can be used to support infrastructure development

such as loans and equity investment in companies and projects, business development, marketing campaigns, technical assistance, research and development, standards development, and public awareness.

- *To scale up RE investment, mobilizing local financing sources is essential*. The local banks, however, are not familiar with RE projects, perceive them as high-risk with high transaction costs, and usually do not offer long-term financing to match the long pay-back period of RE projects. The Forum identified a list of options to address these issues such as standardized lending documents, banker training, using mezzanine finance, and employing risk mitigation instruments and guarantees.

With respect to **private sector investment**:

- *A sound enabling environment of policy and regulatory framework for RE is the key for private sector participation in the RE sector*. Long-term price predictability through long-term Power Purchase Agreements (PPAs) with transparent and adequate pricing is the most important factor. The private sector favors the feed-in tariff as the most effective policy for fostering RE, because it provides a guaranteed off-take price and opens the market for a diverse range of technologies. Tax incentives are also cited as important policy instruments.

- *Administrative risks in securing Government clearance can pose challenges* to RE project development, such as land acquisition and environmental safeguard for wind projects.

- *Risk mitigation instruments are essential* for the private sector to secure financing for RE projects.

- *A number of technical and operational aspects are also important*, such as the quality of the resource and access to reliable resource data, capacity of the grid, interconnection requirements, and dispatch rules.

Finally, the Forum documented numerous country examples and success stories, from both the industrialized and developing world, whereby RE policy instruments have been adopted and the results of RE scale-up demonstrated. It is particularly worth mentioning that an increasing number of developing countries have created or are in process of establishing policy and regulatory frameworks to promote RE. Country case studies also demonstrated that RE is contributing to local employment and industrial development, reducing carbon dioxide (CO_2) emissions, decreasing fossil fuel reliance, and enhancing energy security.

Next Steps

Several countries, such as Mexico, Brazil, China, India, Denmark, Germany, the Netherlands, Spain, the United Kingdom (UK), the United States (US) and others, provided encouraging results in large-scale RE deployment as a consequence of strong policy and regulatory support. Building on these experiences, a number of countries expressed their interest in ramping up RE programs and committed to replicate the successes. These included Croatia, Egypt, Indonesia, Jordan, Nigeria, Russia, South Africa and Tunisia.

Representatives from multilateral and bilateral organizations, the private sector, and the financial and research communities offered follow-on financial and technical assistance to further the progress on existing and planned grid-connected RE projects, programs and policies in developing countries. These included the World Bank, Global Environment Facility (GEF) and the Energy Sector Management Assistance Program (ESMAP), which will provide financial support and technical assistance for policy development, capacity building and investment; the European Union, the private

sector, and IFC that offered a range of financial products, advisory services and resource mobilization support; and bilateral governments (e.g., Germany and the US), multilateral programs, including the United Nations Environment Program (UNEP) and the Solar and Wind Energy Research Assessment Program (SWERA), and research organizations such as the Energy Research Center of the Netherlands (ECN) that offered technical assistance.

1. Introduction

Background

Renewable Energy (RE) is more than just energy. It is reduced risks from hydrocarbon price volatility, enhanced energy security, climate change mitigation, reduction of local environmental and health impacts, regional development, and job creation. Yet the value of these non-energy benefits (externalities) is seldom captured by markets on their own, and even the more tangible economic advantages such as risk reduction are rarely accounted for in traditional power sector investment decision-making.

Without factoring in these non-energy benefits, the prospects for RE development are significantly reduced. Often, when only the short-term "energy value" is accounted for, RE cannot compete with conventional energy options such as fossil fuels on a large scale.

A number of industrialized countries have introduced laws, policies and regulations to accommodate the global and local benefits of RE—beyond energy value itself. Experience shows that, given the capital-intensive nature of RE investments, such policy and regulatory frameworks can accelerate market development, stimulate the scale-up of RE deployment, and hasten the benefits these technologies offer. Though a few developing countries have enacted RE policies and programs, most continue to lack policies to increase the use of these technologies. A major scaling-up effort is needed to foster continued technology cost reductions and broader acceptance of these energy options by the financial markets. Effective policy mechanisms can help to trigger this scale-up.

Today, a range of policy instruments have been adopted in different countries. These include performance-based mandated market policies, financial incentives, public investment funds and risk mitigation mechanisms. Each of these has its advantages and disadvantages. The challenge is to determine the appropriate policy mechanisms for countries to pursue.

Purpose

At the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa in 2002, RE was recognized as a global priority. Two years later, a number of countries and organizations made substantial commitments to support the scale-up use of RE, at the Bonn International Renewable Energies Conference (*Renewables2004*). These commitments were reinforced at the Beijing International Renewable Energy Conference (*BIREC2005*) in October 2005.

As a follow-up to these events, the Energy Ministry of Mexico (SENER), joined the Global Environment Facility (GEF), the World Bank, the Energy Sector Management Assistance Program (ESMAP) and the Global Wind Energy Council (GWEC), in the organization of the three-day International Grid-Connected Renewable Energy Policy Forum.

The goal of the Forum held on February 1-3, 2006, in Mexico City, Mexico, was to stimulate a dialog

that could lead to increased use of grid-connected RE in the developing world. The objectives of the Forum were to:

- To exchange experience and lessons learned on renewable-friendly power sector policies between countries with successful policies—both industrialized and developing—and countries currently in the process of developing or considering new RE policy frameworks.
- To present issues, offer solutions, share lessons learned, and discuss good practices based on country-specific case studies and cross-cutting issues and themes.
- To offer a platform for discussing collaborative opportunities and exploring follow-on activities; this is provided to assist those countries with commitments and plans for developing RE policy frameworks to further advance their efforts.

The Forum brought together approximately 300 participants from 35 countries including both developing country (66 percent of participants) and industrialized country representatives (35 percent). Senior policy makers, regulators, investors, financiers, industry, and utilities responsible for power sector and RE development also attended the forum (Figure 1.1).

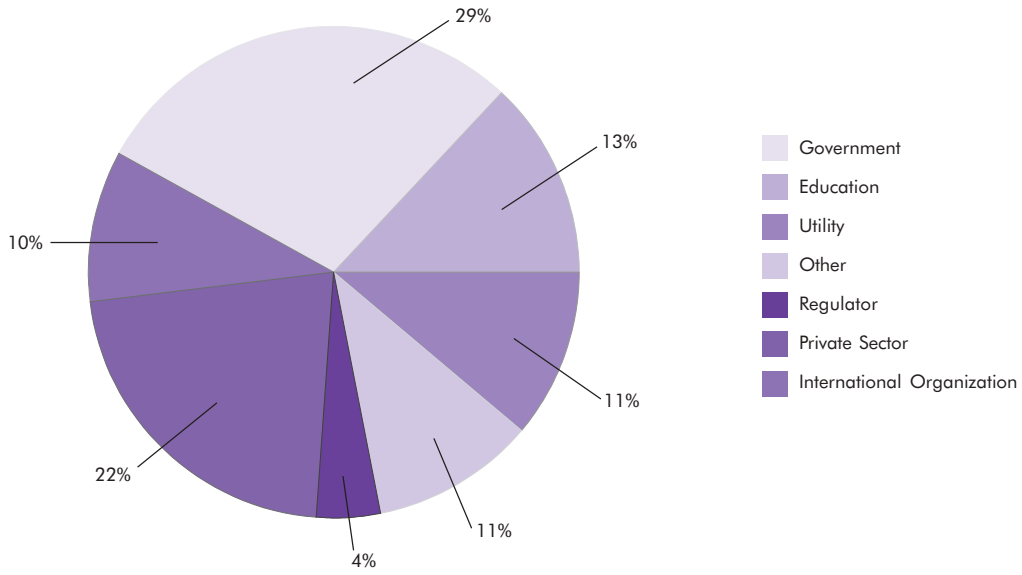
Meeting Overview

The interactive Forum was designed to focus on four core topics: 1) incorporation of RE in power sector frameworks; 2) economic valuation of RE; 3) RE policy instruments; and 4) private sector investment in RE. The Forum presented issues and offered solutions, lessons learned, best practices, and country-specific case studies in both plenary sessions and break-out discussions.

Remainder of Document

The remainder of this document presents the highlights of speaker presentations, breakout groups, ensuing discussions, conclusions, and next steps. Copies of the presentations are provided on a CD affixed to the inside back cover of this document, and can also be found at the Forum Website, www.gridre.org.

Figure 1.1: Participant Breakdown



2. Opening Session

In the opening session of the Forum, senior level speakers addressed the roles and prospects for RE, particularly in the context of the developing country marketplace.

Renewable Energy Progress and Plans

The Forum began by stressing the importance of meeting global energy needs and finding alternatives to fossil energy, especially given rising prices and detrimental climate change impacts. The favorable attributes of RE were highlighted, as were the significant contributions these technologies offer. However, it was noted that many renewable technologies remain expensive and sustained efforts are required to bring these costs down. This should be achievable in the next few years with the concerted efforts of developed and industrialized countries alike.

Mainstreaming Investment in Renewable Energy

With an annual investment of US$30 billion (as compared to US$170 billion invested in conventional technologies, including large hydro), RE can now be considered part of the mainstream world energy scene.

Six key factors are driving the markets for the RE. These are energy security, environmental protection, insurance against fuel price risks, economic development, industrial development, and employment. Depending on the country, the relative importance of these drivers may vary. In Europe, for example, where there is no immediate need for added capacity, the key market driver is the environment. Alternatively, in the developing world, supply concerns, rising fuel prices and economic development issues are spurring markets for RE.

RE, along with energy efficiency, was offered as the preferred "no regrets" avenue for mitigating climate change. As a result, the GEF, along with its implementing agencies, the World Bank, the United Nations Development Programme (UNDP), and United Nations Environment Programme (UNEP), have spent US$1 billion dollars in RE to date. RE is an attractive option for adding safe and clean capacity and power, and is the least politically contentious energy option (after energy efficiency).

RE was also mentioned as a tool for helping to achieve the Millennium Development Goals (MDGs) and lift people out of poverty. It was noted that energy is more than electricity, but also heating, cooling and transport. Modern energy services also include applications such as improved cooking stoves that reduce indoor air pollution, respiratory diseases and child mortality rates.

To date, the bulk of RE development has occurred in only a handful of countries. For example, 85 percent of worldwide wind capacity is located in five countries, while three countries concentrate nearly all Photovoltaic (PV) capacity—and these countries are not even those with the best wind and solar potential. In these instances, policy

interventions made RE a reality. The case of the feed-in law in Germany was provided as an example of good policy, showing the direct correlation between RE market growth and supportive policy frameworks. The stop and start example of the US Production Tax Credit (PTC) shows the detrimental impact that policy designs can have on the creation of sustained markets, businesses and investment.

In industrialized and developing countries alike, market distortions exist which make it difficult for RE to compete. Massive subsidies for conventional energy loom as a primary barrier for RE. Similarly, the inability of the market to internalize the social and environment costs of polluting energy sources also hinders advancement of renewables. Many forms of RE are economic and offer the least-cost solutions today, but deserve fair consideration and a level playing field to compete. In this context, the support frameworks for RE should not be viewed as subsidies but merely as compensation mechanisms. If the markets were not distorted, the need for special provisions would not exist.

Three Government policies were described that mandate grid-connected RE use and foster market deployment:

- Price Mandates, whereby RE generators are paid fixed prices for the electricity they provide to the grid (e.g., feed-in law).
- Quantity Mandates, whereby all electricity providers must obtain a specific market share quantity of RE generation (e.g., renewable portfolio standard).
- Competitive bidding, whereby set quantities of RE generation are purchased on the basis of open competitive solicitations.

Success factors identified in the design of effective RE policies — be they national, state, or local — should include a long-term payment mechanism, access to the grid and strategic grid development, good governance practices and appropriate administrative procedures, and public acceptance and support. Experience shows that if one or more of these key components are missing, little progress will happen. In addition, setting targets serves as an important catalyst for governments to take action and develop the necessary regulatory frameworks, but these have little value if not coupled with policies to establish incentive mechanisms and provide for long-term Power Purchase Agreements (PPAs) that enhance returns for investors. Regardless of the policy option employed, it should provide: streamlined and uniform planning procedures and permitting systems; integrated least-cost network planning; fair access to the grid at transparent prices; removal of discriminatory access and transmission tariffs; transparent pricing for power throughout a network, with recognition and remuneration for the benefits of embedded generation; unbundling of utilities into separate generation and distribution companies; and financing of grid infrastructure development.

Countries interested in developing policy frameworks for RE should start now, rather than wait until costs come down, as it takes time to establish associated institutional and human capacities. Countries that wait 10+ years to get engaged will be left behind.

Other lessons identified in accelerating the deployment of grid-connected RE in developing countries included:

- Only technologies which are already proven should be deployed in developing countries. It is not appropriate to add technology development risks to the commercial, financing, and other risks that new markets and new technologies in developing countries already face.
- It is important to be open to all Renewable Energy Technologies (RETs), including large-scale hydropower. It is also valuable to be technology-neutral, and not overly focused on any particular solution. Multilateral organizations like the World Bank and GEF are

not the right actors to pick "winning" technologies. This should reside at the local level, and in the marketplace.

- Engagement of the private sector in RE program development is key.

- The deployment of RE on a large-scale is about far more than technology. It concerns human and institutional capacity, Government regulatory and policy frameworks, business models, and financing.

Finally, several of the speakers expressed their continued and strengthened support for RE in developing countries:

- The GEF committed to remain an active player in expanding RE business throughout the developing world, with plans to invest at least US$100 million additional per year for RE into the future. The GEF is now moving from a technology demonstration approach to a much greater focus on helping to create the kind of enabling environment in which RE can flourish, to include addressing issues such as capacity building, regulatory frameworks, incentives, good information, business and technical infrastructure, etc. With limited resources, the GEF thrust is less on a single investment and more on a sustainable process of investment. GEF also offered to continue to share experiences and lessons learned.

- The World Bank described its substantial and growing portfolio of activities in the area of RE and energy efficiency. In 2005, with the help of GEF, the Bank exceeded its commitment made at the Bonn *Renewables2004* Conference, reaching investments of three-quarters of a billion dollars and leveraging an additional US$3 billion from the private sector, governments and others. In the future, the Bank pledged to do even more, through agencies such as ESMAP, the Asia Sustainable and Alternative Energy Program (ASTAE), and the new Clean Energy Investment Framework—an outcome of the G8 Gleneagles meeting.

- Germany offered Renewable Energy Network for the 21st Century (REN21), and other partnerships, as mechanisms for information sharing and reporting. These entities can help to build on the work of *Renewables2005* and *BIREC2005* and contribute to achieving meaningful results at the 14th and 15th sessions of the UN Commission for Sustainable Development (CSD), to be held later this year.

In Summary

RE is a strong and growing industry, concentrated today in a handful of countries but with enormous prospects for growth. Several factors are driving the escalation of RETs worldwide, led by economic development, energy security, and their "no regrets" solution for tackling climate change. Well-designed policies can boost markets for these technologies, just as poorly designed policies stall their advancement. However, the critical first step is to reduce existing fossil fuel subsidies and other market distorting effects. A range of mandated market policies exist for scaling up investment in grid-connected RE but, regardless of the approach taken, key principles should apply: strong legal framework; well designed, long-term payment mechanism; open access to the grid; and public support. Financial incentives and long-term PPAs can further strengthen investor confidence and reduce risks. Multilateral and bilateral support exists to help developing countries put effective policy and regulatory frameworks in place, drawing upon the experience base of industrialized countries that have been active in the field for more than 20 years.

3. Challenges and Prospects of Grid-Connected Renewable Energy

This session discussed opportunities, barriers and models for large-scale, grid-connected RE deployment worldwide.

Global Perspectives on Renewable Energy

RETs offer enormous benefits. They utilize locally available resources, displacing the need for costly fuel imports; are environmentally beneficial; reduce risks from hydrocarbon price volatility; and create local job and income opportunities. RE is versatile in scale and can work on-grid or off-grid. RETs have an enormous role to play in securing and diversifying the energy mix of countries worldwide, yet their potential has only begun to be realized, particularly in the developing country marketplace. Rapid increase of RE in these countries will require establishment of supportive policy and regulatory frameworks, strengthening of local capacities, and increasing access to financing. It will necessitate maximizing use of hydro resources (large, small, and micro) in an environmentally sustainable manner; more efficient use of biomass residues for power generation and transport; and increasing the deployment and reducing the costs of solar, wind, geothermal, wave, tidal, and other RE sources.

Today, RETs are the fastest growing of all energy technologies and are cost-competitive in a variety of grid and off-grid applications. The take-off of RE has commenced, with growth rates of technologies such as solar and wind occurring at 25-30 percent per year. RETs have experienced steep learning curves over the last decade, and this is projected to continue into the future. Prices are likely to continue to fall across the RE spectrum, unlike the fossil fuel sector. With such rapid growth, it has been difficult to forecast where prices will be in the mid- to long-term.

Policies and incentives have been essential ingredients in enabling countries to reach mature markets while experiencing rapid cost reductions, reducing risk perceptions, and improving operating efficiencies. Today, 48 countries have RE policies and a variety of instruments and approaches are available.

The role of subsidies for RE continues to be a major source of debate, yet these have been shown to be essential in moving markets forward and leveling the playing field with heavily supported fossil fuels. Well-designed subsidies can jumpstart Renewable Energy Technology (RET) deployment and over time these can be reduced/eliminated. The key lies in transparent, open systems that encourage new market entrants; long-term contracts; proper prices; and grid-access regulations.

Renewable Energy Scenarios for the Future

Two options were presented regarding the future for RE. Under its business-as-usual scenario, the International Energy Agency (IEA) World Energy Outlook (WEO) projects an increase in the total demand of energy to more than 16,000 million Tons of Oil Equivalent (TOE) by 2030. In this

scenario, oil and gas account for more than 60 percent of world primary energy demand; world oil production will shift away from Organization of Economic Cooperation and Development (OECD) nations to countries such as Saudi Arabia and Iran; gas reserves will be concentrated in former Soviet Union countries and the Middle East; and global CO_2 emissions will grow more than 50 percent, with developing country emissions overtaking those of the OECD nations in the 2020s. Per capita energy use remains low in developing countries, and if no new policies are implemented, 1.4 billion people will continue to lack electricity in 2030. Though renewable electricity generation will increase six-fold by 2030, mainly from wind and biomass, the overall percentage of RE will remain relatively constant at 2 percent. These trends raise serious concerns regarding energy security, the environment and energy poverty.

In its alternative policy scenario, IEA/WEO includes more aggressive policy measures in the power generation, transport and residential/commercial sectors. These policies would stimulate the use of RE, energy efficiency and cleaner fossil fuels, and yield striking improvements in security of energy supplies, reduction of emissions, and increased access to energy for poverty alleviation. No "revolutionary" policies are needed to reach this alternative scenario, but more vigorous use of existing policies that make economic sense. IEA is a proponent of the market economy, yet given the magnitude of the challenge, there is an urgent and decisive need for governments to be proactive in correcting market failures and steering the world onto a markedly different energy path.

Country Case Studies in Renewable Energy

Brazil. The energy system of Brazil has a very high penetration of RE in the total energy supply (44 percent), and in the generation of electricity (88 percent). Brazil continues to foster RE development through a number of policies: the New Hydropower Policy, aimed at building large hydro schemes; the Biodiesel Policy, which seeks to increase national biodiesel use; the Luz para Todos Program (Lights for All), which is targeting 2.5 million new connections by 2008—of which 200,000 will be supplied by RE; and an Ethanol Policy aimed at increasing domestic application of ethanol (1 million flex fuel vehicles in 2005) and exports. Most notable, however, is the auction-based Renewable Energy Incentive Program (PROINFA), which has a goal of 3,300 megawatts (MW) of RE, shared equally between wind, biomass and small hydro (1,100 MW each). PROINFA offers clear and stable regulatory frameworks, guaranteed 20-year power purchase contracts with the national utility ELECTROBRAS, and favorable financing terms with the Brazil National Development Bank (BNDES) of 20 percent equity, 80 percent debt, and 12-year financing. At least 60 percent local content[1] is required under PROINFA, with incremental costs transferred to the consumer. Expected results of the program include creation of 150,000 jobs (direct and indirect), US$3.8 billion in total investment, diversification of producers and sources of energy, and estimated avoided emissions of 2.8 million tons of CO_2 per year. During the initial phase of PROINFA, progress has been slower than anticipated due to a number of difficulties that resulted in program delays and extensions, including an inability of users to pay for energy services, manufacturing and licensing constraints, new environmental requirements, disagreements in contract negotiations, and a longer time for PROINFA to operationalize than originally anticipated (from decree, to bidding, to construction, to access). Despite these obstacles, however, projects are now moving forward.

India. In India, generation capacity is split among the states, the central Government and the private sector. Hydropower accounts for 26 percent of total installed capacity and other renewables an additional 5 percent for a total contribution of 31 percent. At present, the power sector is undergoing a process of reform, with new rules defined in the Electricity Act of 2003 aimed at fostering competition, protecting consumers, and increasing

[1] *Local content is the proportion of inputs to be supplied from within the country.*

access. RE potential is significant, estimated at over 80,000 MW, with development to date of approximately 6,700 MW. A key barrier to the scale-up of RE in India is the lack of a national policy; to date technology advancement has been due in large part to state-level policies. At present, India is the only country in the world with a dedicated Ministry of Non-conventional Energy Sources (MNES), and a financing entity for RE, Indian Renewable Energy Development Agency (IREDA). IREDA has played a catalytic role in creating awareness, encouraging private sector investments, stimulating market development by showcasing success stories, and helping to create manufacturing, design, engineering, operation and maintenance capabilities in the country. The efforts made by IREDA and the MNES have encouraged several states to establish policies and incentives to encourage private investments in the sector. IREDA has also assisted the Government's shift in policy from funding technology-driven Government installations and RE development programs, to commercialization through subsidy provisions and to the establishment of demand drivers. IREDA has committed more than US$1.6 billion, disbursed US$844 million, and approved over 1,700 projects. Bilateral and multilateral organizations are the primary source of funding. Key obstacles to growth identified by IREDA include: absence of assured consumers and markets; small, dispersed nature of RE projects and associated high costs; 90 percent of small hydro potential is in hilly areas with no industrial base (no demand); the key buyers, State Electricity Boards (SEBs), are unwilling to pay more for RE; absence of aggregating agencies/traders; lack of understanding the economic benefits of RE, particularly by regulators; and frequent policy changes.

Mexico. Mexico is increasingly dependent on natural gas for the generation of electricity which has presented problems as prices have been highly volatile over the last five years and a growing share of this fuel is imported. The current policy framework establishes State-control of electricity transmission and distribution. Private sector participation is limited and consists of two schemes—Independent Power Producer (IPP) and self-supply. The existing electricity law presents barriers to RE development as the national utility, the Federal Electricity Commission (CFE), follows a least-cost principle for acquiring energy from third parties, and the benefits of RE (social, economic, environmental) are not valued. The strategy of SENER is twofold—to showcase RE projects to increase investor confidence and to strengthen the policy environment. On the project side, activities include the GEF/World Bank Large-Scale Renewable Energy Development Project; the GEF/United Nations Development Programme (UNDP) Action Plan for Removing Barriers to the Full-Scale Implementation of Wind Power; and some wind, solar, geothermal and hydropower projects executed by CFE. In addition, an accelerated depreciation allowance for RE investments was enacted in January 2005, and a new contract template for remote self-supply projects (where the generation is located away from the consumption, and electricity is wheeled through the grid) was published in January 2006. This allows for energy banking, favorable wheeling charges, and the offset of demand charges according to average peak-time generation. Finally, SENER has collaborated with Congress in the development of a new Renewable Energy Act. This Act has already been sanctioned by the lower chamber of Congress in December 2005, and is awaiting Senate approval. If it is passed, a public fund for offering performance-based incentives on a bid system would be created.

Spain. Spain's aggressive policy for the promotion of RE is geared towards: (1) reducing energy dependence, as the country relies on imports for 80 percent of its primary energy supply; and (2) creating jobs. The policy also contains economic, environmental and social objectives. The Renewable Energy Plan (PER), which covers the period 2005-2010, calls for RE to represent at least 12 percent of primary energy consumption, contribute to 30 percent of total electricity

consumption, and account for approximately 6 percent of total petroleum and diesel consumption in the transport sector. The PER is expected to result in US$28 billion in investment, contribute over 10 million TOE, create approximately 95,000 jobs (industrial and agricultural from biofuels), and avoid over 76 million tons of CO_2 emissions. In 2004, Royal Decree 436 provided significant incentives for RE. This included guaranteed grid access and a two-tier feed-in system that enables producers to choose every year between a fixed price tariff and a floating tariff (determined by the prime rate plus incentive plus market price). To date, the majority (80 percent) have opted for risk and high returns (floating tariff), rather than security (fixed tariff). Tariffs are technology-dependent, and an average reference tariff, published every year, is applied to new projects (in 2005 this tariff was 7.3304 euro cents per kilowatt hour, kWh). In order to foster industrial development and job creation, Spain imposes a large local component requirement in RE projects. The findings of the European Commission's (EC's) ALTENER project demonstrate that RE is more labor-intensive than conventional energy technologies, with job creation occurring primarily in small- and medium-sized enterprises. Further, an important portion of the employment generated is in low income regions.

In Summary

RE has a significant role to play in enhancing energy security, improving the environment, and contributing to economic development. Accelerated deployment of these technologies is achievable with well-designed policies and market corrections to value the positive attributes of these technologies. Although an increasing number of countries are putting policies and programs in place to support RE, more aggressive action is needed by governments *now* to avoid a business-as-usual reliance on fossil fuels and the negative consequences this scenario will yield.

Countries are pursuing different policy options for promoting RE, with all setting targets and timetables for RE development. The Brazil PROINFA program is using an auction based system to develop grid-connected wind, hydropower, and biomass technologies, which has run into a range of administrative, contractual and financing delays that are now being addressed. In India, RE activity has taken place primarily at the state level, lacking a national RE policy. India is the only country with dedicated RE financing agency and energy ministry. Outstanding barriers to grid-connected RE in India include the SEBs which are often not financially solvent and unwilling to pay higher rates for RE; policies and incentives that are inconsistent over time; and a lack of understanding of economic benefits of RE by regulators.

Mexico employs the least cost principle which makes it difficult for renewables to compete, particularly as there is no added value for the benefits of these technologies. Additionally, there is a limited role for the private sector in Mexico's vertically integrated utility structure. Several steps have been taken to increase the role of RE and the private sector, with support of the World Bank and GEF, and a new proposed Renewable Energy Act would further enhance the contribution of these technologies in a country highly dependent on fossil fuels.

Spain has shown the success of the feed-in tariff and that effective policies can be put in place to stimulate local job creation and industrial development.

4. Renewable Energy in Different Institutional Power Sector Frameworks

This session addressed the various institutional power sector frameworks existing around the world today, and the pros and cons of each.

Mexico: State-owned Fully-Integrated Utility

CFE is a vertically integrated utility, one of the two State-owned utilities in Mexico. (The other utility, Luz y Fuerza del Centro or LFC, covers distribution in the central area of the country.) CFE is responsible for planning, construction and operation of the national electric system and is subject to regulation and supervision by the Mexican Government. Each year, the House of Representatives approves the CFE budget, with tariffs set by the Ministry of Treasury. CFE has an installed capacity of 46,686 MW in 218 power plants, and has 22 million consumers. Based on econometric models, CFE defines the investment program with the lowest cost for the electric sector with a 10-year planning horizon. CFE projects new installed capacity requirements of 21,529 MW through 2015. The planning document is updated annually based on historic trends, expected population growth, regional demand growth, economic growth scenarios, and power generation technologies. Several RETs are included in the current 10-year plan, including five large hydropower projects, six wind projects (100 MW each), two geothermal projects, and one concentrated solar power (CSP, embedded in a hybrid system with a combined-cycle natural gas plant). In order to comply with the policy framework, non-competitive technologies (wind and solar) have been included in the planning process due to the availability of external incentives with donor support.

United Kingdom: Renewable Energy Development under Fully Privatized Market

UK energy policy goals aim to: put the country on a path to cut CO_2 emissions by 60 percent in 2050, with significant progress by 2020; maintain reliability of energy supplies; promote competitive markets; and ensure that every home is adequately and affordably heated. In theory, the UK operates a "competitive" electricity market, with regulated networks. This means that there is no intervention in the market, it is technology and fuel blind, the workings of the electricity market are the same for renewables as for any other source of electricity, and any help for renewables (or other technologies) is indirect or external to the market. Support for RE in the UK involves the Renewable Obligation (RO, 2002-2027), research and development (R&D) estimated at around US$30 million, and capital grants to the tune of US$150 million over 2002-2007. The current British policy for RE, the RO, places an obligation on the suppliers to meet a certain percentage of the previous year's supply from eligible renewable electricity. The suppliers can either meet the obligation by purchasing renewable obligation certificates (ROCs), or by paying a penalty which is raised each year. The penalty fund is recycled back to the suppliers in the proportion that they met the total annual RO target. The supplier and the RE generator agree on the price, contract length and volume. Findings to date are that the RO has

not met expectations, achieving only about 60 percent of its targets (today the UK obtains only 2 percent of its electricity from RE). This is due to several reasons. First, the design of the system has yielded a perverse incentive whereby suppliers benefit by *not* reaching the target, as achieving the target means the reward is less. Second, the system discourages new entrants; the stringent obligations placed on suppliers to obtain value from renewables as outlined above, favor incumbents who are able to take the risks and deal with the transaction costs. This has limited innovation and the development of a mentoring base for renewables, and few investors have emerged. Third, it supports only the cheapest technologies.

Indonesia: Small Power Producer Program

Indonesia has significant RE potential, however, there has been limited development to date. Currently, renewables account for about 15 percent of total installed capacity of which the bulk (12 percent) comes from large-scale hydro and some geothermal development (2 percent). Today, Indonesia has a number of policies in place to promote RE power generation: the Green Energy Policy, which calls for implementing the maximum utilization of RE and energy efficiency; Small Power Distributed Generation Using Renewable Energy which supports small enterprises with capacity less than 1 MW; Medium-Scale Power Generation Using Renewable Energy which supports businesses with capacity less than 10 MW; Regulation on Electricity Supply and Utilization which prioritizes RE for power generation; and the Geothermal Law which regulates the management and development of geothermal resources for direct and indirect utilization. In the field of RE, Indonesia stands out for its development of small-scale (under 10 MW) grid-connected RE projects through the small- and medium-scale policies identified above that have set tariffs to be paid to generators at 60 percent of the utility's production cost if the project is connected to the low voltage grid, and 80 percent if connected to the medium voltage grid. In addition, for medium-scale projects from 1-10 MW, the policy establishes an extendable 10-year power purchase contract. To further increase the utilization of RE, Indonesia is taking a number of actions which include formulating a directive policy on investment and financing; creating an incentives policy (to include tax and fiscal incentives and a depletion premium); and increasing R&D activities.

In Summary

In a vertically integrated system, such as Mexico, the utility has full responsibility for the national electric system, including purchasing power from IPPs, and is usually subject to independent regulation. RE generators that represent the least cost options will enter the electricity mix like any other generator. Newer technologies, or those technologies that are not least cost, will find it difficult to compete. By convincing utility planners and regulators of the value of renewables generation, and/or making incentives sufficiently attractive to enable RE to compete on its own financial merits, this barrier to market entry can be overcome.

In a fully privatized utility market, such as the UK, decisions are also made on a competitive basis, in this case one that is technology- and fuel-neutral. There is no intervention to support RE, however, suppliers are obligated to meet a certain percentage of the prior year's supply from eligible renewable electricity basis. This laissez-faire market approach of the UK has not met expectations. Additionally, the UK system has been a barrier to new market entrants, limited innovation in the marketplace, and resulted in minimal investment in the technologies.

Small power producer programs, such as the one in Indonesia, have streamlined the process for connecting small power producers to the grid. These programs often include standardized PPAs, tariff-setting procedures, interconnection regulations, and standards.

5. Valuation of Renewable Energy

This session introduced the importance of more effective valuation of RE and better accounting of the positive attributes that these technologies have to offer.

Utility Planning and the Renewable Energy Supply Curve

Rational utility planning requires knowledge of what is likely to be economic if the tariffs were based on its avoided costs, that is the marginal cost for the same amount of energy acquired through another means such as the construction of a new production facility or purchase from an alternate supplier. This can be determined by preparing an indicative RE supply curve whereby the quantity Megawatt hour (MWh) that is economic is given by its intersection with the avoided cost ($/MWh).

The example of Vietnam was used to describe the effects of the RE supply curve. Vietnam was selected because it has over 2,100 MW of capacity, and though the Government has prioritized its development, barriers exist and very few projects have reached financial closure. These barriers include: the resistance of commercial banking system to loan tenors of more than seven years; the lack of enthusiasm of the local utility, Electricity of Vietnam (EVN), to embracing 2,100 MW of small, run-of-river hydro plants; non-standard, ad hoc, PPAs based on cost plus "fair return"; the insistence of EVN on confidentiality when issuing PPAs; the very broad published tariff guideline (US$0.03-0.047/per kWh); high transaction costs; and the inability of developers to optimize project design and finalize feasibility studies without a set tariff.

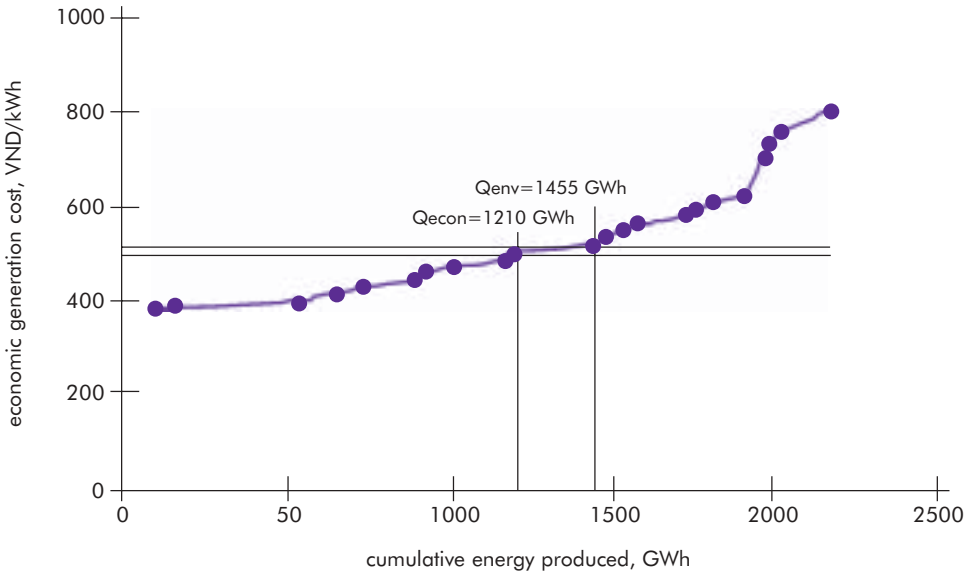
The Draft National Master Plan for Vietnam lists 408 small hydro projects totaling 2,925 MW, 82 percent of which have a capacity less than 10 MW. As depicted in Figure 5.1, Qecon shows the avoided cost of 505 Vietnam dollars (VND)/kWh (US$0.031/kWh) at about 1,210 GWh. The projects to the left of Qecon are sometimes called win-win because they are cheaper than the competitor's and have no (or very small) environmental impacts. However, due to the barriers cited above not all of the projects to the left of Qecon will be developed.

At this level, the supply curve is very flat which means that small increments in tariff can result in a substantial increase (or decrease) in the number of economic projects, and therefore in the amount of economic generation. Assigning even marginal amounts to externalities such as local environmental and health impacts, climate change mitigation, or real economic costs of fossil fuels can yield substantial impacts on the development of RE. In this case, the optimum amount of small hydro increases to Qenv or about 1,455 Gigawatt hour (GWh). Similar analyses conducted in China, Croatia and South Africa confirmed the merits of RE supply curves as a useful planning tool. Supply curves can also be used to derive standardized PPAs and a published avoided cost tariff which

minimize the transaction costs of implementing RE. Further, in the case of Vietnam, it showed that EVN should not be in the business of negotiated tariffs and rates of return, and the Government should not set the tariffs. The issue of project financial viability is best left to the banks that may need training in risk assessment (e.g., hydrology risks, construction risks, etc).

effectively hedged, RE can help *mitigate* it. The micro level addresses the risk that future fossil fuel costs will fluctuate over time. Individual investors can hedge this risk with financial instruments, though this comes at a cost (e.g., a six-year gas hedge is estimated at US$0.008/kWh in one study). Society, however, does not benefit, as hedging does not eliminate risk but simply shifts it to someone else.

Figure 5.1: Cost Impacts on Optimal Generation



Portfolio Diversification and Free Hedging

The value of RE was discussed, featuring its role in portfolio diversification, energy security and hedging. It was highlighted that in electricity generation, fossil fuel risk generally takes two forms—micro- and macro-economic level risks. At the macro level, it is widely accepted that fossil fuel price volatility hurts unemployment and Gross Domestic Product (GDP) growth, both for oil consuming and producing nations. For example, over the period 1970-2000 in the US, oil price volatility imposed US$7 trillion in costs to the country. Studies show that every MWh of non-gas generation in the US saves consumers US$7.50-20.00. Though macro level risk cannot be

To address this, one needs to adopt finance theory principles and include risk energy investment decision making, since risk affects value and economic expectations. It was documented that by including risk and portfolio diversification in the portfolio planning process, lower-cost-equal-risk alternatives, and equal-cost-lower-risk alternatives often include RE. The risk structure of RE investments is very different from the one of conventional energy supply technologies, and therefore, an effective hedge can be provided. Renewables produce energy plus price certainty and enhance energy security. Portfolio diversification may be the only free lunch for hedging fossil risk, even if one believes that RE costs more, as adding them to a fossil generating mix reduces overall cost risk. Unfortunately, analytic

tools used by the electricity industry today do not reflect this, leading to poor decision making and planning. IPPs typically cannot capture the risk mitigation benefits of RE, leading to under-investment relative to the optimal societal mix. It is time to shift the grounds for debate; the issue is no longer *if* RE, but *how much*.

Valuing the Capacity Contribution of Intermittent Sources – The Danish Experience

The Danish power system is organized into two sections: the East Danish system which is interconnected with the Nordic system in Norway and Sweden, and the West Danish system interconnected with the Continental system in Germany and beyond. The Danish system is characterized by its high wind power production, accounting for about 19 percent of total consumption. This has been driven by feed-in tariffs established in the country. Due to the intermittency of wind, the demand for capacity reserves and ancillary services has been increased, yet the interconnection to Norway, which is 100 percent hydro, has helped to regulate the intermittency of wind systems on the grid. Further, an unfavorable geographic situation exists in that: (1) the interconnection with Germany has a very similar wind situation, and (2) there is a sparse population and lack of load in the coastal areas where the resource is the strongest, making energy transport an issue. In Denmark, the supply of wind power is sometimes so large compared to the load that the marginal benefit of its production is zero or less. Areas for further work include: (1) infrastructure issues, including increased balancing power needs and grid expansion; and (2) international issues, such as interconnectors for cross-border trade and harmonized grid codes for new wind farms.

This presentation sparked an interesting discussion on the intermittent nature of wind and its effect on grid stability. In general, it was noted that intermittent renewables could account for up to 30 percent of the total electricity supplies, without creating stability issues depending on the strength of the transmission grid and if renewables operate in conjunction with fossil fuels or hydropower to regulate the intermittency. Capacity credit was highlighted as an important factor in intermittency; its proper assessment requiring a location-specific study of the coincidence between the RE resource and peak load requirements. Further, dividing the wind turbines geographically across the system increases the capacity value as different wind patterns at the sites can make the wind turbine output less intermittent. Finally, emerging storage possibilities (e.g., compressed air energy storage) and new grid-operating strategies should enhance the value of intermittent technologies.

Importance of Credible Resource Information: Solar and Wind Energy Resource Assessment – The SWERA Program

The Solar and Wind Energy Resource Assessment (SWERA) Program, supported by UNEP/GEF, seeks to remove information barriers to solar and wind energy development through better quality and higher resolution resource assessment. In its first stage, SWERA covers 13 countries in Latin America, Africa and Asia. The experience of SWERA shows that credible information on RE resources has been a key factor for the development of appropriate RE policies. Energy planning entities need to have basic knowledge about national resources in order to propose new legislation; likewise, legislators need to be well informed to approve new policies. Resource data are also key for governments to encourage and promote local development, for companies and utilities to prepare bankable projects, and for local and international financial institutions to consider investment and mitigate risks. Typically, when SWERA first goes into a country, it finds that existing solar and wind maps are outdated; the country's focus is on hydro and geothermal development, with wind considered a more advanced, costly and complex technology with intermittency and dependency issues; and there is limited knowledge of the significant technology and

cost advances of "current" solar and wind technologies. By providing reliable data, SWERA has managed to transform these perceptions and show that solar and wind are real alternatives for developing countries. For example, SWERA has demonstrated that technologies often regarded as "firm", such as hydropower, are subject to droughts and other risks. Solar and wind can help to firm up energy resources to the grid through diversification and hybrids, and thus help to shave load peaks for hydro, reduce diesel imports at non-firm prices, reinforce the distribution system, and contribute to hydro storage and save water. Solar, wind and other RETs also provide modern energy services for economic development in rural areas.

In Summary

Tools exist today for more effective valuation of RE and improved accounting of the benefits these technologies provide. Several examples were provided for improving the case for RE in overall utility planning.

RE supply curves offer a useful tool for utility planning by demonstrating the quantity of RE that is below the avoided cost of supply today (win-win scenario), and which could be fully deployed assuming the removal of any outstanding technical, institutional and market barriers. If environmental externalities are taken into consideration, the true social cost of competing energy alternatives increase, as does the optimum quantity of RE. Supply curves can help to demonstrate the effects of market distortions hindering the advancement of RE such as in China and South Africa, determine the economically optimal quantity of grid-connected RE as in the case of small hydropower in Vietnam, and provide the basis for setting RE targets as in Croatia.

Utility portfolio diversification is a means for hedging fossil fuel price volatility risks. The risk-adjusted costs of many renewables is lower than gas-fired electricity and likely cheaper than long-term financial gas hedging. As IPP investments cannot capture this, and utilities fail to include it in their planning, this market imperfection arguably creates an economic basis for establishing public policies that support renewables.

Access to credible RE resource data is necessary for utilities to make sound planning decisions and for policy makers to establish appropriate RE policies and implementing regulations. The example of wind resource intermittency, and the importance of mapping resource availability to peak load requirements in determining capacity credits, was highlighted as one example of the importance of reliable resource data collection. The SWERA program has been effective in providing decision makers with sound solar and wind data in the countries where it operates, and helping to expand markets and investment.

Lastly, it was suggested that there is a need for improved analysis on issues related to RE and grid interconnection, both at the country level and cross border.

6. Renewable Energy Policy Instruments

This session reviewed the various policy instruments in the market today and the impacts they are having on increasing the use of RETs.

Mandated Market Policy Overview

Three main policies have been used worldwide for promoting the entry of new and emerging RETs into electricity markets: feed-in laws, renewable portfolio standards (RPS), and tendering policies.

- With *feed-in laws*, the Government sets a mandated *price* to be paid for renewable electricity, usually technology-dependent, and the utility must take power from eligible facilities. Feed-in laws are focused on new and emerging technologies and there are three methods for price setting: (1) estimated long-term cost plus reasonable profit; (2) wholesale avoided cost of power; and (3) percent of the retail electricity rate. Key success factors in feed-in laws are long-term contracts of 15-20 years, guaranteed buyers under a standard contract, tariffs that provide reasonable rates of return, and flexibility to capture cost efficiencies.

- With an *RPS*, the Government sets a mandated *quantity* of RE to be purchased, it focuses on new and emerging RETs, and there is a requirement on wholesale or retail market participants (utility or grid company) to purchase the power generated. RPS success factors require good policy design, establishment of an energy/output-based target that increases over time, strong and effective enforcement methods (it is better not to have an RPS than to have a non-enforceable one), and creation of a certificate trading platform based on compliance tracking. The use of certificates makes for a more liquid market.

- *Tendering policies* involve Government-sponsored competitive bidding processes for the acquisition of renewable electricity, whereby long-term contracts are awarded to lowest priced projects. The Government contract guarantees the purchase of all power generated at a specified price over a fixed period and the Government pays the incremental cost of the RE. Tendering is usually done in conjunction with other policies, such as public benefit funds or resource concessions (e.g., wind). Success factors for tendering include long-term standard contracts which reduce the risk for investors, contracts/tenders that are large enough to achieve economies of scale and are awarded annually to create stability, appropriate penalties for not meeting milestones, and a stable source of funding.

Table 6.1 provides an assessment of the advantages and disadvantages of the three policy options, using the following criteria: quantity of RE development over a specific timeframe; impact on both cost and price reductions; results in resource diversity; long-term market sustainability; local industry development; certainty for investors;

and simplicity of implementation. Findings are summarized below.

Feed-in laws have resulted in the largest RE installed capacity. They are the simplest to administer and enforce; produce the greatest resource diversity and local industry development; can be cost-effective if the tariff is periodically and wisely adjusted over time to eliminate excess rent payments; and work best in regulated markets. They are flexible and can be designed to accommodate differences in technologies and in the marketplace. They invite steady growth of small- and medium- scale players, result in low transaction costs, offer easy entry by new players, and facilitate financing. The key challenge is establishing the tariff, particularly for new technologies where the true costs of the systems are unknown and/or variable.

The RPS is good at minimizing costs and prices but only if accompanied by long-term, well designed PPAs; offers good resource development, especially if combined with tradable certificates; and is more compatible with reformed electricity markets. They provide certainty regarding market share (if targets are met), are perceived as being more compatible with open or traditional power markets, and are more likely to fully integrate RE into electricity supply infrastructure. They also facilitate the establishment of a RE credit trading system. Challenges are that an RPS may take longer to build local industry and meet resource targets; can be complex to design, administer, and enforce; have high transaction costs, and lack flexibility (e.g., difficult to adjust in short-term if needed).

Competitive tendering is best at minimizing costs, as long as the industry is well established; can be

Table 6.1: Renewable Energy Policy Review

	Quantity of RE Development	Cost/Price Reduction	Resource Diversity	Market Sustainability	Local Industry Development	Investor Certainty	Simplicity
Feed-In Laws	Large amounts RE in short time	Cost efficient if the tariff is periodically and wisely adjusted	Excellent	Technically & economically sustainable	Excellent	Can reduce investor risk with price guarantee & PPA	Most simple to design, administer, enforce, contract
RPS	If enforced, can meet realistic targets	RPS *and* tendering best at reducing cost & price with competitive bidding	Favor least-cost technologies	Technically & economically sustainable	Favor least-cost technologies & established industry players	Lack of price certainty difficult for investors/ PPA can reduce risk	More complex to design & administer, complex for generators
Tendering	Related only to quantity RE established by process	Good at reducing cost	Favor least-cost technologies	Tied to resource planning process; sustainable if planning supported, stable funding	Favor least-cost technologies & established industry players	Can provide certainty if well designed (more risk than feed-in)	More complex than feed-in, simpler than RPS

combined with an RPS; will not build a market by itself, but needs companion policies; can discourage local industry formation if not carefully used; and can be politically challenging as it requires a stable source of funding. Competitive tendering tends to favor large, centralized merchant plants at the expense of small investors and ensuring that signed contracts are realized is a key challenge. If tendering is tied to resource planning and a transparent procurement process, investor certainty can be enhanced.

In each of these cases, the policies can enable electricity suppliers to recover the incremental cost from consumers, and connection to the grid is vital.

In summary, each of the three policies offers pros and cons; there is no perfect policy solution. Thus, it is vital for policy makers to articulate and prioritize their goals, to determine which policy intervention makes the most sense; recognize that this is a dynamic decision that must be continually reviewed and assessed; understand that enforcement of mandates is critical; and ensure good policy design which is fundamental to success.

California's Competitive Tendering Mechanism

The state of California has set the stage in the US for RE deployment. California has aggressive and explicit targets for development in every aspect of the clean energy sector. Renewable generation targets are 20 percent in total generation by 2010 and 33 percent by 2020, and these goals are achievable. In 2004, California produced 10 percent of its electricity from eligible renewables (does not include large hydro which contributed 15 percent).

An early surge in the development of RE took place between 1978 and 1995, when electric utilities were compelled to sign long-term power contracts, at non-competitive prices with any renewable electricity generator using eligible technologies. During this period, substantial capacity was added, yet little incentive was given for technology improvement and cost reduction. Since 1995, when the power market was restructured to introduce competition at the retail level, California has sought models for continuing the development of RE in this new market framework. At first a *reverse auction* mechanism was introduced, whereby renewable generators would compete against each other for public funds, with the lowest bidder winning. Generators would separately offer their renewable power to consumers via the new, non-utility energy service providers (ESPs). This approach had great economic merit, but never had a chance to prove itself due to the collapse of the entire wholesale electricity market in 2000-2001. Though the auction worked, the electricity market did not, and uncertainty destroyed the development incentives. After the crisis, a "middle way" was introduced and has proven successful. This new managed wholesale competition system is based on an RPS and strives to achieve both lower costs over time and technological improvements, with the stability and certainty of the regulated utility market. The RPS bidding process involves a number of steps, beginning with the submission of an RPS plan by the investor owned utility. This is reviewed, amended and approved by the Public Utility Commission (PUC), and utilities then solicit power from renewable generators. The state then calculates a "market price referent" (MPR) on the basis of the long-term avoided cost of natural gas generation—including hedging—to achieve a fixed price. The utilities pay costs up to the MPR, and generators must compete for access to public subsidy funds that cover the remaining costs. The prize is long-term, fixed price contracts (10+ years).

How well is managed competition working in California? In practice, the system is working. Between the first RPS solicitation by the utilities in 2004 through October 2005, 3,000 MW of new renewable contracts have been approved by the State. Since October 2005, another 2,500 MW have been approved. To date, no public subsidies have been needed due to the increased costs of

Renewable Energy Deflects Fossil Fuel Price Increases in Germany

During the plenary discussions, Dr Volker Oschmann announced that an article had come out in the German press during the time of the Forum stating that while electricity prices had increased in the country due to rising fossil fuel prices, the impacts were mitigated due to the fact that 11 percent of the country's electricity supply is from RE. As a result, one of the largest German utilities did not have to increase their retail power prices to consumers, despite significant oil and gas price hikes.

natural gas. The challenge now is to get these plants built efficiently and to develop enough transmission to deliver the power.

Germany: Feed-in Tariff Law

The German policy is based on the RE Act, the feed-in law that fixes prices for electricity from RE, gives planning and investment security, and encourages private action and investments. This is the main instrument for promotion of RE electricity in Germany, and the most successful instrument to reduce CO_2 (52 million tons were reduced in 2004). The goal of the RE Act is a sustainable electricity system based on RE. Near-term objectives are to develop RE, create an innovative industrial base, and facilitate economies of scale to achieve cost reductions. The RE Act gives RE priority access to the electricity grid, obliges grid operators to purchase RE electricity, and fixes the price (tariff) for RE electricity. The steps involved are: RE Act sets the tariffs and pay period; the RE producer feeds electricity to the grid; the grid operator pays remuneration (no state aid); and the costs are transferred to consumers, via a surcharge of approximately 3 percent of the electricity bills. The tariffs are differentiated and depend on plant size and technology, and are determined by means of scientific studies, assuming payback periods of 16 to 20 years, and reasonable internal rates of return (e.g., approximately 10 percent for wind power). The tariff remains constant for commissioned installations, but depends on the year of the initial operation—the later an installation is commissioned, the lower the tariff.

To date, the RE Act has yielded significant results. RE in Germany has grown at 10 percent per year since 1999, accounting for 11 percent of electricity share by the end of 2005; contributed to 150,000 jobs; and provided the equivalent investment of US$7.2 billion. A recent study by the European Commission compared the policies of the member states and their effectiveness, and concluded that "feed-in tariffs are currently cheaper and more effective than quota systems (e.g., RPS), because they give high planning and investment security, are easy to handle, and involve low transaction costs". The European experience also corroborates the importance of regulations, and that these must be carefully and properly designed.

Financial Incentive Policy Overview

This financial incentive discussion began with a definition of "support" or subsidies for RE as the total cost, to either the public budget or to the electricity consumer, of purchasing renewables rather than buying electricity at a price which reflects no Government intervention. Four main *drivers* for the establishment of financial incentive policies for RE were identified: the cost-competitiveness in electricity supply; the creation of jobs; the security of supply; and the environment. The relative weight of these drivers will vary depending on each country's priorities. The design of the support scheme will depend on the various objectives a country or sub-national entity may have and these can generally be classified into three areas: (1) those concerned with the *impact effectiveness* of policies, such as job creation, technology development, market expansion, or energy portfolio diversity; (2) those that have to do with the policies' *distributional efficiency*, namely, the reduction in the cost of support per

generated kWh, the reduction in transaction costs, or the removal of distortions in the power market; and (3) those related to the *burden-sharing efficiency* of policies, which refers to how the support offered is shared between electricity consumers and tax payers, between energy-intensive industries and other industries, or among the different utilities.

Both demand- and supply-side instruments are available to promote RE. Demand-side instruments, which shift the demand towards renewables, include green electricity, tax benefits, tradable, credits, etc. Supply-side instruments, which improve the cost-competitiveness of RE, include investment subsidies, low-interest loans, topping up kWh premiums, R&D, and environmental taxes. Table 6.2 shows the different financial incentive mechanisms used by governments, and classifies them according to the financial mechanism (*who pays*) and the support *target*. (This example focuses on wind power.) In most cases, the policies employed are actually combinations of these various mechanisms.

The key policy approaches in the market today are the feed-in tariff (including a premium on top-of-the-spot market price), the tradable green certificate (whereby RE electricity is sold at conventional-energy market prices with the incremental costs passed onto producers or

Table 6.2: Renewable Energy Financing Mechanisms

Financing Mechanisms	Subsidy Targets		
	Cost of Investment	**Price of Output**	**Operating Costs**
Public Budget Finance Instruments	• Direct capital subsidies • Soft loans • Value added tax (VAT) exemption • Import duty exemption • Accelerated depreciation • Tax holidays on income • Subsidies to exporters of RET equipment • Subsidies to RD&D	• Topping-up premiums to producers • Production tax credit • Topping-up premiums to consumers • VAT/excise duty exemptions • Public green electricity purchases	• Subsidies to the marketing of green electricity
Electricity Invoice Finance Instruments	• Grid reinforcement (deep connection costs) paid by utilities • Part of (shallow) connection costs paid by utilities • RD&D of power utilities on interfaces between wind farms and regional/ national power system	• Premium feed-in tariffs for RE electricity • Renewable Portfolio Standards with or without Renewable Energy Credits (RECs) • Eco-taxes on alternative fuels • Voluntary green consumer premium tariffs	• Wheeling tariff below the true cost of utility • Balancing costs charged to consumers not to generators • Use-of-system charges fixed below cost • Subsidized administration of green invoicing
Subsidized Export Credits to RETs	• Soft loans for RE-investments • Grants for project preparation		
Greenhouse Gas Payments		• CO_2 certificate • Certified Emission Reduction (CER)/JI revenue/kWh	

consumers), periodic tenders for MW (open for any new wind farm or for concessions for wind farms at specific sites), and pure tax-financed support. In order to choose among these policy approaches and to design the policy details, attention needs to be paid to the specific policy drivers. For example, if job creation is a relevant driver, then additional incentives can be offered to projects with high regional production share, as in the case of Spain, Ontario and China. Financial considerations regarding the cost of capital (risk and expected rate of return) deserve attention as well. Since investors demand return in proportion to risk, when no long-term contracts are offered (as in the UK system), capital costs are higher. From this perspective, the feed-in tariff is ideal for investors as there is no market risk and the project can be implemented any time during the year once financial closure has been reached. Also, the formal procedure for signing the PPA with the system operator or local utility is simple.

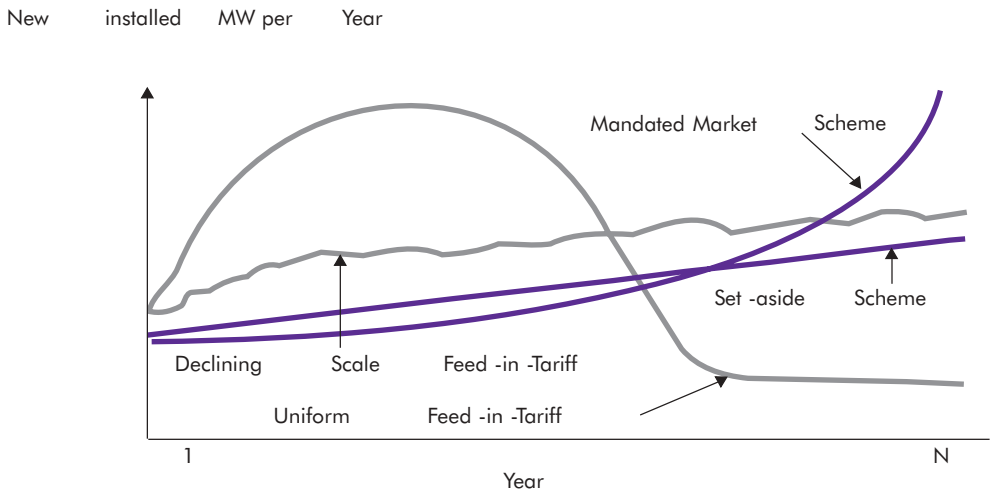
As another example, since a private investor's project rate of return will almost always be higher than the public sector's discount rate for public investments, offering a higher tariff during the first 10 years, and then a much lower tariff during the next 10 years, may be a good public investment. Finally, setting the right level of support and adjusting it according to the circumstances is essential.

Figure 6.1 provides a review of the development of wind farm potential over time for the various policy approaches.

US Federal Production Tax Credit and other Incentive Policies

The relative merits of performance-based and investment-based policy measures to support RE in the marketplace was discussed in the context of the US marketplace. It was noted that the selection of policy tools to achieve cost-effective results is highly dependent upon a range of factors, including: technology maturity; technology risk profile; the size and location of the project; the motivations, income levels and needs of the investors; the organizational structure and management of the developers; the public benefits, etc. Where the objectives are economic efficiency and market-based promotion of RE (as in the US), it is important to match policy designs with incentive mechanisms (whether supply- or demand-oriented) that take into account technical, market and

Figure 6.1: Development of the Wind Farm Potential over Time: Price and Quantity Approaches



financial constraints. Policy tools need to be developed to reduce clean energy costs while providing revenue certainty that will in turn reduce financial risk premiums. While it is desirable to design policies so that subsidy levels are tied to project performance, investment incentives need to be considered if the conditions necessary for creating a long-term predictable revenue stream cannot be met. Moreover, policy support should be compatible with competition in the marketplace, of limited duration, and value-producing.

These observations were substantiated by examining policy support for RE within the US. For example, the 2005 Energy Policy Act provides a range of policy incentives, including fiscal and credit-based mechanisms. Using these tools, the US Government is addressing market failure that is impeding the deployment of RETs. Among other things, targeted risk-sharing can help build the market for RE in a manner that leverages private capital, focusing on areas where RE can contribute significant benefits, such as reducing peaking demand, increasing grid reliability, capturing price premium for green power consumers, reducing emissions, etc. The Administration is also working with states and localities that have developed an array of incentive programs to enhance RE market development.

Netherland's Experience in Grid-Connected Renewable Energy Policies

The Dutch experience in RE policy was described as one of "going in circles". It was explained that the power sector of the Netherlands has undergone a process of reform during the last 20 years, from State-owned vertically integrated utilities to the current situation of unbundling and partial privatization. Accordingly, the RE policy framework has evolved through a number of stages covering a range of options as shown in Table 6.3.

In particular, prior to 1996, capital subsidies were provided on a first-come basis. The process for project selection was not transparent and the budget was limited, resulting in manufacturers maximizing kW not kWh. From 1996 to 2002, the Netherlands moved to a green label system with tradable certificates. At that time, this was an innovative approach that was coupled with voluntary green electricity, a large consumer base and an associated consumption tax credit. The system yielded enormous growth of green kilowatts to consumers (40 percent today, 3 million people). However, the electricity was sourced from cheap, often existing, RE from other EU countries, resulting in an outflow of billions of euros in tax monies to other countries. From 2003 to present, this system was replaced by a fixed premium system, which is a subsidy per kWh provided on top of the market price. This system, which is still in place, is financed by an annual levy of 35 euro per connection point. The program has led to growth in RE, particularly of wind and biomass co-firing, yet the funds are not sufficient to cover expenses and there is a deficit of billions of euros. The Government is now considering putting in place a tender mechanism or an RPS. In conclusion, politicians have had difficulties in understanding the complex dynamics of support mechanisms in liberalized markets,

Table 6.3: The Renewable Energy Policy Matrix

	Price	Quantity
Supply	Feed-in systems (premiums, fixed tariffs, production tax credits) Capital subsidies	Tendering systems
Demand	Consumption tax credit	Renewable obligations (with or without tradable certificates)

resulting in inconsistent and flawed policy designs that have not taken into account the economic behavior of investors. In addition, the permit procedures have limited the installation of RETs. Nonetheless, the Government is now learning from the favorable experiences of other countries. In closing, it was highlighted that the next big policy issue that must be considered is that of integration of RE with emerging distributed generation technologies. In order to face this challenge, the EU Fenix project has proposed a new model for grid control based on "smart energy systems". This concept requires real-time metering, and both time- and location-dependent pricing and tariffs. From a decision maker perspective, this means regulations and policies that will foster these kinds of business models—and this is not obvious.

In Summary

Three key policies have emerged for promoting widespread use of RE – feed-in laws, RPS and tendering. Thus far, feed-in laws have resulted in most additions in renewable electricity capacity and generation worldwide, while reducing costs through technology advancement and economies of scale, and creating domestic jobs and industries. With periodic adjustments to the fee to account for cost reductions, these feed-in laws have proven to be most desirable by investors. In some instances hybrid policies are emerging, such as the case of California which operates a wholesale competition system based on an RPS.

In addition to these policy mechanisms, there are a range of finance instruments available to improve the cost-competitiveness of RE (e.g., investment subsidies, low interest loans, topping up kWh premiums, etc.) or increase the demand for the technologies (e.g., green electricity, tax benefits, tradable credits).

In general, there is no perfect policy solution; they should be selected based on policy maker goals and objectives. Also, these policy options are not restricted to the national level, numerous examples exist at the state and local levels as well.

Finally, some important points raised during the presentations were:

- When no long-term contracts are available, capital costs are higher (e.g., UK).
- Some countries are moving away from the feed-in tariff to an RPS, either because it has become financially unsustainable (e.g., the Netherlands) or because there is a lack of control over the amount of RE entering the grid (e.g., Korea).
- If job creation is the key market driver, additional incentives can be offered to projects with high regional production share, as in the case of Spain, Ontario and China.
- To jumpstart a market, offering a higher tariff during the first 10 years and a much lower tariff in the following 10 years may be a good public investment.
- In the future, smart energy systems will be important in RE grid integration.

7. Renewable Energy Public Financing and Planning: Stakeholder Perspectives

Session 7 discussed the importance of public and private sector investment in RE, both at the global and local levels, and described various funding sources.

Sustainable Energy Financing

An analysis of the financing requirements for grid-connected RE projects shows a number of gaps constraining development. In particular, there is a lack of project development and seed capital, a lack of long-term finance, a debt/equity gap (often only up to 50 percent debt is available), and a lack of risk management instruments. The UNEP Sustainable Energy Finance Initiative (SEFI) collaborates with public and private finance institutions on initiatives to fill these gaps (see the publication *Public Finance Mechanisms to Catalyze Sustainable Energy Sector Growth*). Similarly, on the insurance side, conventional programs do not cover the range of risks involved in the different RETs; currently, only wind appears to be sufficiently covered through conventional insurance products. As a new effort on this front, SEFI, with GEF support, is conducting an assessment of financial risk management instruments for RE projects, leading to recommendations on ways in which the private sector and the donor community could help drive innovation in RE risk management markets (see the publication *Financial Risk Management Instruments for Renewable Energy Projects*). Moreover, SEFI has been working with Export Credit Agencies (ECAs) to increase support for RE. In the lead up to *Renewables2004*, SEFI coordinated a working group of ECAs to explore ways to collaborate with industry, and in April 2005, a special Sector Understanding was negotiated for RE (and water) to extend the minimum repayment terms for RE projects to 15 years. This allows ECA financing to be more closely aligned with PPAs, and therefore can lower a project's cost of delivered energy. Summing up, the experience of SEFI shows that innovative public finance is *not* only pure equity or debt, but rather a blending of risk/return attributes. It is *not* just about capital, but also enterprise development services. It is *not* for the public sector to do on its own, but in partnership with commercial first movers. It is *not* just about innovation, but also replication and mainstreaming. And it is *not* just about capital and services, but also about changing mindsets.

Public-Private Partnerships for Investing in Renewable Energy—US State Renewable Energy Funds

Within the US, the states have led the historic transition in clean energy. In the 1990s, the restructuring of the power sector took decision making power away from utilities and gave more power to state legislators. This was an opportunity for states, especially those with environmentally inclined legislators, to lead an unprecedented transition in clean energy. This was consistent with the American historical trend of states playing a prominent role in development projects and being at the forefront of technology innovation. Over the

period 1997-2006, there has been a state-level revolution on energy. Efforts have included an explosion of RPSs put in place, establishment of incentives and cap and trade mechanisms, and creation of SBC funds. Today, 14 state energy funds are operating which will bring nearly US$4 billion dollars of investment over the next decade. These state funds support a wide range of activities, including technology creation, business development, and commercialization via company investments, consumer incentives and market conditioning. Several strategic models or combinations of these models are followed for the use of these state funds:

- The project development model, whereby incentives and grants directly subsidize project installation, as in California and New Jersey.
- The investment model, which involves loans and equity investment in companies and projects, as in Connecticut.
- The industry development model, which provides business development grants, marketing support, technical assistance and education to build industry infrastructure, as in Wisconsin.
- The Research and Development (R&D) model, as in California and New York, which provides grants and cost-share support for technology creation.
- And the combined model, as in Massachusetts, which utilizes a mix of the above approaches.

Also, through the Clean Energy States Alliance, states are beginning to work together on a cooperative basis to engage new states and to participate in a number of international initiatives focusing on finance and technology collaboration. An international sub-national network has been formed, and collaboration is occurring on issues of climate stabilization and technology agreements, transatlantic investment, pensions and institutional investments, and exchange on innovative public financing. In the future, work needs to focus on technology innovation if the emission stabilization objective of the Kyoto Protocol is to be met.

Bilateral Agency Experience in Financing Grid-Connected Renewable Energy

Kreditanstalt für Wiederaufbau (KfW) is a public bank of the Federal Republic of Germany with a balance sheet of 341 billion euros in 2005, and new commitments of 69 billion euros this year. KfW is based in Frankfurt with over 50 offices around the world. KfW bonds have been assigned the highest rating by Standard & Poor's, Moody's, and Fitch ratings. About 75 percent of KfW's business is in Germany, and 25 percent is international, with a focus on supporting developing and transition countries governments, promoting private sector development, and providing export and project finance support. In the field of RE and energy efficiency, KfW has been a significant player with commitments in 2005 of 6.1 billion euros—3.6 billion for RE and 2.5 billion for energy efficiency. Activities supported by KfW in the field of RE include:

- Concessionary financing through the KfW Development Bank, such as soft loans or grants, development loans with low interest rates, a Study and Expert Fund for preparatory activities, a Special Fund for RE and Energy Efficiency, and cooperation with the German Technical Cooperation (GTZ) and bilateral and multilateral financial institutions.
- Commercial financing through the Deutsche Investitions-und Entwicklungs-gesellschaft (DEG), which includes equity participation and mezzanine loans.
- Export and project financing through the KfW IPEX Bank.
- Innovative financing instruments, such as carbon credits, via the KfW Carbon Fund.

Over the last few years, KfW's support for RE has been growing, led by hydro, solar and wind technologies. This trend is expected to continue as demand warrants.

The Role of Carbon Finance in Accelerating Grid-Connected Renewable Energy

This presentation provided an overview of the Kyoto Protocol, which entered into force with Russia's ratification. Today, all industrialized countries (e.g., Annex I countries), with the exception of the US and Australia, have ratified it, committing to a set of legally binding Greenhouse Gas (GHG) reductions averaging 5.2 percent of their 1990 emission levels. Under the Kyoto protocol, Annex 1 countries may achieve these reductions either domestically or by supplementing their domestic efforts through three international market-based mechanisms. These are: international emissions trading; the Clean Development Mechanism (CDM), whereby developed countries purchase emission reductions from developing countries; or Joint Implementation (JI), where developed countries purchase emission reductions from developed countries and economies in transition. The first compliance period is 2008-2012. The quantitative relevance of carbon revenues in grid-connected RE projects depends on the nature of the energy situation in the country, being higher in countries with greenhouse-gas-intensive economies such as those with significant coal consumption. It also depends on the technology. Landfill gas, biogas from livestock and poultry waste, and other biomass projects that lead to methane emission reductions are by far the most favored, as methane has a potent greenhouse effect. Typically, carbon revenues amount to between 2-10 percent of investment costs, making a difference, but not necessarily a deal maker. The relevance of carbon finance is its catalytic role, providing a bankable revenue stream with a high quality cash flow. In the near term, carbon finance is reaching a critical stage. The window to deliver projects for the first commitment period of the Kyoto Protocol (2008-2012) is almost fully closed for long lead-time projects such as large hydropower and geothermal, and will close in 2006 for other projects. In this context, it is essential to seek a decision on the second commitment period of the Protocol or an alternative post-2012 trading scheme.

In Summary

Several sources of financing for RE were discussed in this session. In the US, 14 state energy funds have been established which will provide nearly US$4 billion of investment in the next decade for domestic and international activities in RE. ECAs have extended their minimum repayment terms for RE projects to 15 years. Bilateral organizations provide a range of financial and technical assistance for RE projects and programs in developing countries, with KfW serving as one of the world leaders in this area. The World Bank and regional development banks have made RE a priority and carbon finance is playing a catalytic role in RE finance. Outstanding financing gaps in the area of RE include lack of project development and seed capital, lack of long-term finance, a debt/equity gap, lack of risk mitigation instruments, and insufficient insurance products.

8. Breakout Groups

In this session, Forum participants divided into four breakout groups in order to promote discussion and information exchange, to lay the groundwork for advancing existing and new programs in RE, and to identify areas for follow-on support by countries, the World Bank, GEF and others. The four groups were:

1) RE and power sector reform.

2) Mainstreaming RE into power sector planning.

3) RE policy instruments.

4) Mobilizing local capital for RE.

For each group, participants were asked to address the following four questions:

- What are the key issues/barriers to the scale-up of RE?
- What are successful approaches/models for grid-connected RE?
- What are major next steps and how do we move forward?
- What is the role of key players in advancing RE in developing countries?

Moderators were assigned to facilitate the breakout sessions, and rapporteurs took notes during session discussions and reported the findings.

Breakout Session 1

Renewable Energy and Power Sector Reform, *Mr Charles Feinstein, Moderator, and Ms Marta Rivera, Rapporteur*

In this session, participants discussed a vertically integrated system versus various options for unbundling the electric system, as distinguished by the degree of independence and market responsiveness of the levels of generation, transmission, distribution and consumer service. There are numerous gradations of unbundling, and many systems operate as hybrids. For example, commonly competition and private sector participation may be introduced in the generation sector through the entry of IPPs selling to a "single buyer" (a state utility) which may simultaneously own and operate certain generation assets (e.g., hydropower) as well as the integrated transmission/distribution system. Further liberalization may involve the creation of a wholesale generation market, where large consumers are free to buy power from independent power producers under bilateral contracts; an extension of these arrangements involves creating a real time or day-ahead spot market to provide balancing services to the underlying wholesale market. Still more liberalized/unbundled systems may comprise, in addition to the multiplicity of generators, multiple and independent distribution entities serving distinct geographical markets serving customers on the basis of electricity purchased in wholesale and spot markets.

Generally speaking, vertically integrated systems offer economies of scale and economies of scope. But the amount of RE capacity is centrally planned and determined by a monopoly that is often resistant to change. Under the vertically integrated system, long-term contracts are needed for IPPs to ensure success and there is very little sensitivity to risk on the part of the single buyer, which needs to manage the mounting contingent liabilities represented by the IPP contracts. This can work against the price stability offered by RE producers, as their advantage may not be recognized and valued by the single off-taker.

In an unbundled system, there is competition, and the individual market actors respond to the rules set by the regulator and implemented by the transmission entity or the independent system operator (ISO), allowing for more flexibility. There are typically increased opportunities for private generators, as the specific attributes of RE can be matched up with the power characteristics sought by consumers. For example, an intermittent RE source may not be seen as attractive to a heavy process industry requiring 100 percent firm power; however, this same producer may find a ready market with an entity that needs to pump water at low cost as and when electric energy is available. As such, each actor has to manage his/her own risk. However, RE may need special treatment to participate in highly liberalized markets dominated by short-term and spot power trading. The capital intensity and long asset lifetime of renewables projects imply that long-term contracts, such as PPAs, are needed for the RE generators.

Regardless of the structure, "cookie cutter" or generalized solutions are to be avoided, and each case should be looked at individually. An over-arching truism, however, is that governments need to specifically consider upfront the impacts of proposed regulatory changes and new market structures on RE, as their characteristics differ from standard fossil sources. It is usually difficult to retrofit solutions to accommodate desired RE provision, once a specific market organization has been designed and implemented.

Breakout Session 2

Mainstreaming Renewable Energy into Power Sector Planning *Mr Anil Cabraal, Moderator, and Mr Claudio Alatorre Frenk, Rapporteur*

In this session, a number of issues and barriers for mainstreaming RE into power sector planning were identified. These included: RE is perceived as more expensive by utilities; resource and performance data uncertainty leads to inadequate tariff structures; there is a lack of capacity by renewables to be absorbed into the network due to intermittency and unpredictability issues; there is a perception of technological immaturity; market distortions exist due to concessional loans to public utilities; utility decision makers do not bear the fuel price risks; existing planning models do not capture the benefits of RE; and institutional and regulatory barriers prevail that hinder implementation.

The group identified a number of successful approaches for addressing these barriers: widespread application of multi-factor planning tools that are available today in some developing countries; independent and capable regulation to enforce more effective utility planning practices; transmission system operators that maximize access, properly value diversity, reduce transaction costs, and create transparent and competitive markets; and investment in new technologies and approaches.

In order to move forward there is a need for Government commitment and actions to set clear policy goals and directions for the power sector; strengthening the capacity of regulators and RE agencies to deliver; breaking down the utility planning tools monopoly; building the capacity and diversity of utility planners; supporting demonstration schemes for new technologies and approaches; collecting better quality resource data and improving access to this information; and introducing streamlined mechanisms to include RE in the carbon trading market.

In terms of the roles of key players: governments must take action and set national goals for RE;

regulators need to enforce these goals; donors should support capacity building and technology transfer; the private sector should organize to make a more effective case for RE, including building partnerships between foreign manufacturers and local distributors/operators; and the banking sector must be educated on how to evaluate RE projects/benefits and manage associated risks.

Finally, all these activities require long-term engagement— and patience—to change mindsets of the various stakeholders.

Breakout Session 3

Renewable Energy Policy Instruments

Dr Griffin Thompson, Moderator, and Mr Alvaro Rios, Rapporteur

In session 3, participants identified issues, solutions and follow-up actions for successful use of policy instruments in scaling-up RE in developing countries. For key issues and response, see Table 8.1.

Table 8.1: Breakout Session 3: Issues and Response on Renewable Energy Policy Instruments

Issue	Response
Feed-in tariff may not work in developing countries	Small incremental costs in the beginning Consumers may be willing to pay for energy security
Strong fossil fuel lobby and lack of political will for RE	Public awareness Level the playing field between conventional and RE
How to incorporate RE and energy efficiency into power sector reform	Sector reform should address renewables and efficiency and this should be done early in the process
Lack of RE resource data, information, mapping	Engage SWERA and other tools Do not wait for 100 percent information Engage with private sector
What are the options for financial incentive mechanisms?	Accelerated depreciation, production-based tax incentives, fossil fuel tax, etc.
What are the RE policy instruments to expand energy services under the context of poverty with more expensive RE?	Off-grid market niches, links to poverty reduction and income generation
Lack of local manufacturing	Create market demand, supply will come
Definition of RE	Each country can define what this constitutes
Low tariff/subsidies	Feed-in tariff for RE; guaranteed grid access; pro-poor subsidies
Institutional competition barriers	Formulate systemic approach in a more integrated manner; bring in many institutions

Breakout Session 4

Mobilizing Local Capital for Renewable Energy *Mr Eric Usher, Moderator, and Mr Antonio Huerta, Rapporteur*

During this session, participants listed a number of barriers to mobilizing local capital for RE from the banker/investor perspective: uncertain revenue streams; challenge of getting bankable projects; a lack of familiarity by banks with projects/developers; investors do not see the profit margins; high transaction costs; failures of past RE projects; dominance of public sector; the lack of familiarity with the RE sector; lack of long-term financing; different banks have different needs (e.g., commercial, development); private banks do not look at projects or savings they generate, just at the balance sheet; and bankers do not know how to conduct due diligence.

From the perspective of the developer, the following issues were identified: small companies lack capital and have high transaction costs; public sector competition; lack of reliable resource data; issues of red tape, administrative bureaucracy, permitting requirements and contracting; difficulty with first-time projects; foreign exchange and other risk that cannot be hedged; collateral requirements; lack of debt, equity and working capital; high cost/time in raising capital (in some cases up to 10 percent of funds being raised); lag times in payments; and having consumers that do not pay.

The list of options that can help address these issues included: standardized documents; banker training; bringing in experts who can help the banks with due diligence; finding financing institutions with knowledge and willingness to deal with this sector; enlarging the project experience base; easing permitting and reducing red tape; facilitating working capital and finance; providing guarantees and partial guarantees; hedging of renewable resource risks and other risks (e.g., foreign exchange); and education/promotion campaigns for RE. Other tools that could help are: bundling of projects to reduce transaction costs; securing PPAs with transparent pricing; using mezzanine finance; employing risk mitigation instruments and guarantees; having public bank lending, insurance and guarantee structures; and setting up lines of credit in commercial banks.

In Summary

Each of the breakout groups were tasked with answering four questions. The results of their discussions are provided below.

What are the key issues/barriers to the scale-up of RE?

- Perceived risk of utilities
- Resource and performance data uncertainty
- Intermittency and unpredictability issues
- Market distortions
- Utility decision makers who do not bear the fuel price risks
- Planning models that do not capture the benefits of RE
- Institutional and regulatory barriers that hinder implementation
- Lack of public awareness of the benefits of RE
- Lack of banker knowledge of risks of RE and how to address these; lack of long- term financing
- Administrative bureaucracy/red tape
- Collateral requirements

What are successful approaches/models for grid-connected RE?

- Standardized documentation
- Development/application of effective policy measures such as feed-in laws and RPSs, as well as financial instruments
- Long-term PPAs to reduce risks
- Widespread application of multi-factor planning tools
- Independent regulation of utilities
- Transmission system operators that maximize access
- Effective valuation of RE benefits
- Reduced transaction costs
- Create transparent and competitive markets
- Credit enhancements, guarantees and risk-sharing approaches with financial institutions
- Investment in new technologies and approaches.

What are the major next steps and how do we move forward?

- Public information campaigns
- Incorporate RE into power sector reforms
- Ease of permitting and reducing red tape
- Provision of guarantees, partial guarantees and other financial risk-sharing instruments to local financial institutions and establishment of dedicated credit lines
- Government commitments to renewables and setting up of clear policy goals for the power sector
- Strengthen the capacity of regulators, utility planners, Government agencies, financial institutions and others on RE
- Support demonstration schemes for new technologies and approaches
- Collect better quality resource data and improve access to this information
- Introduce streamlined mechanisms to include RE in the carbon trading market

What is the role of key players in advancing RE in developing countries?

- Governments should set national goals for RE
- Regulators need to enforce these goals
- Donors should support capacity-building, technology transfer and financial risk sharing and credit enhancements
- The private sector should organize to make a more effective case for RE
- Financial institutions should invest in RE projects and manage associated risks.

9. Round-table Discussion: Enhancing Private Sector Investment

In this session, several private sector firms presented their views on scaling-up investment in RE.

Enel – Belgium

Enel is developing and operating geothermal, hydropower, wind, biomass and solar projects in a number of countries of Europe and the Americas. According to its experience, feed-in tariffs are the most effective policy for fostering renewable electricity, since they provide a guaranteed off-take price and facilitate different incentives for diverse technologies. However, they require that incentives are set at appropriate levels and that instruments to control efficiency are foreseen. Quota systems with tradable certificates have the virtue of creating two markets—one for power and one for the green value of energy. This approach favors the less costly technologies and there is a constant need to control costs. A third option—investment subsidies—has been gradually abandoned in Europe due to the high burden it imposes upon governments and the low efficiency it engenders.

Iberdrola – Mexico

Iberdrola has an installed capacity of 4,000 MW, most of which is based on clean energy sources (natural gas, hydro and wind). Currently, it is developing wind power projects in Spain, Mexico and Brazil. From Iberdrola's experience, the feasibility of RE projects depends on their sustainability, i.e. their social, environmental, and economic attributes. In addition, a number of technical and operative aspects are essential, such as the quality of the resource, the capacity of the grid, the interconnection requirements, the dispatch rules, and the availability of tax incentives. RE projects require adequate tariffs and long-term power purchase contracts.

EDF – Mexico

EDF has an installed capacity of more than 125,000 MW worldwide. Although only 0.36 percent corresponds to non-hydro RE, the company is committed to increasing this, by allocating an initial fund of 3 billion euros to its subsidiary EDF Énergies Nouvelles. With regards to Mexico, EDF applauds the RE bill now in Congress and the efforts by the Government and the regulatory commission to foster RE, in particular, the inclusion of 500 MW (100 MW per year over five years) in IPP projects in the current expansion planning of CFE (with the assistance of the GEF-funded Large-Scale Renewable Energy Development Project). However, given the substantial wind energy potential and the problems with hydrocarbon supplies in the country, the current RE goals of Mexico seem symbolic. Much more ambitious goals are achievable.

Acciona Energía SA – Spain

Acciona Energía is a firm devoted exclusively to RE, and has no business interests in conventional energy technologies. It seeks to abandon the current energy model, which is based on energy "mono-crops" and characterized by cyclical energy

crises. The primary advantage of RE is undoubtedly price stability, and these technologies can help poor countries that are the hardest hit when prices go up. At present, however, RETs cannot always compete with conventional technologies. RETs have high initial investment costs and require a stable, assured market, and protection against the oligopoly of conventional energy.

Econergy International/Clean Tech Fund – Mexico

Unlike 10 years ago, a very favorable environment for RE projects now exists. This is characterized by low interest rates, goodwill, investor liquidity, carbon trading mechanisms, and growing interest from a range of financial institutions including the World Bank Group, international and national development banks, and commercial banks. In addition, increasing prices of fossil fuels, favorable regulations in countries like Mexico, and existing and new policy frameworks in many countries are opening the doors for RE investments. The time is right to develop projects. However, since this is a new market, the first set of projects will be challenging. The market has many niches for players of all sizes. The Clean Tech fund managed by Econergy is aimed at medium sized projects, larger than US$10-20 million. Econergy's experiences show that projects below this size range are uneconomic due to their high transaction costs.

Bhoruka Power – India

The private sector is the key player for the implementation of RE projects. The main issue it faces is risks associated with project development, which increase financial costs. The primary risks are: policy risks which can be addressed by long-term policy and regulatory frameworks; resource risks, to be addressed by long-term resource data access (e.g., at least 10 years for hydropower, three years for wind power); administrative risks in securing Government clearances, especially concerning land acquisition, which could be helped with the establishment of one-stop windows for clearance intervention; financing risks which could be solved by improved debt/equity ratios and risk mitigation instruments; and human risks which require capacity development to enhance plant performance. Tariff risks are mitigated when stable incentives are offered, with feed-in tariffs definitively the best option. Furthermore, in India there are additional risks when the projects are connected to unstable grids; it is preferable to connect to a stable grid, even if this involves investing in 10 kilometers (km) of additional transmission.

MesoAmerica Energy – Costa Rica

Central America lacks a consistent and well thought-out RE plan, with the existing situation operating as a *policy salad*. This disarray is due, in large part, to the self-serving lobbying efforts of some private developers with good political connections. Although they have managed to raise awareness about RE in Central America—a positive movement in a region dependent on expensive fossil fuels—their aggressive lobbying tactics have had negative consequences resulting in confusion, resistance, and a push-back against RE. In this context, trustworthy institutions such as the World Bank and GEF have a major role to play in developing a credible, objective framework for the region and information dissemination. On the latter, a simple first step could be free subscriptions to RE magazines for Government officials. Further, project developers need to develop high-quality projects with realistic expectations.

In Summary

Overall, the private sector speakers were optimistic about RE and the role it is playing and will continue to play in meeting the energy needs of developing countries. More and more countries are putting policies in place to encourage development of RE, carbon trading mechanisms are emerging, and there are a growing number of international, development and commercial banks engaging in the financing of RE projects and programs. Further, the rising prices of fossil fuels are opening the door to RE investments.

From a policy perspective, the speakers favored the feed-in tariff as the most effective policy for fostering RE, in that it provides a guaranteed off-take price and opens the market for a diverse range of technologies. Yet the tariff must be set at appropriate levels, and mechanisms to control efficiency must be foreseen. Quota systems, with tradable certificates, have the benefit of creating two markets—one for power and one for the value of green energy. This approach favors the least cost technologies and requires constant attention to controlling costs. A third option—investment subsidies—has been gradually abandoned in Europe due to the high cost burden imposed on governments and its low efficiency. Tax incentives were also cited as important policy instruments.

Key technical and operational aspects for RE include the quality of the resource and access to reliable resource data, capacity of the grid, interconnection requirements, and dispatch rules. Long-term PPAs are also important.

Several speakers noted a key advantage of RE, particularly for developing countries is its price stability, as these countries are hit hardest with fossil fuel price increases. Yet this benefit is not accounted for. Though some RE options are cost-competitive today, others are not, and the economics could be enhanced if subsidies for conventional energy were eliminated and/or the benefits of RE properly accounted for.

Finally, a number of the speakers indicated that in the countries where they operate, the private sector could do much more to contribute to meeting energy needs and displacing fossil fuel, yet they are hampered from doing so by policy and regulatory frameworks that limit their participation.

10. Round-table Discussion: Moving Forward on Scaling-up Grid-Connected Renewable Energy

This session involved presentations by country delegations interested in reporting on how they intend to move forward with the difficult work of designing and implementing policies to advance clean energy, energy security, and development.

Croatia

Croatia is a country with 4.5 million people that currently imports 55 percent of its fuel, and this percentage is going up. Today, Croatia has installed capacity of 4,000 MW, of which 45 percent is hydro, 15 percent nuclear, and the remainder fossil fuels. Significant potential exists in the country for biomass, and the key market drivers for RE are the Kyoto protocol, the EU targets, and job creation. The energy sector in Croatia has been harmonized with EU directives and the country is developing RE-supporting laws which will seek least-cost solutions. Croatia has worked with the World Bank to identify efficient levels of renewables in the overall energy mix and has established a goal of 400 MW, with a tariff impact of around 1.1 percent. Key issues for implementation are: who will pay the incremental cost, how will this be transferred to producers, and what is the role of various institutions? A regulatory framework was developed to answer these questions, a feed-in system is underway, and a fund was established to collect SBCs across all consumers. The three pillars are: guaranteed feed-in tariffs, declining each year; an energy efficiency fund; and state subsidies for companies outside of state sector, aimed at increasing employment. It is anticipated that biomass use could create 5,000 indirect jobs by 2015. Currently, an assessment is being conducted to review and revise the feed-in tariffs, as they might be too high.

Egypt

The electricity sector in Egypt depends on three pillars: diversifying electric energy resources, improving energy efficiency and maximizing energy conservation measures, and enhancing the role of RE in the production of electricity. The New and Renewable Energy Authority (NREA) was established as a dedicated organization to introduce RETs to Egypt on a commercial scale. In order to achieve the goal of covering 3 percent of the electric energy demand by 2010, and to reach 17 percent by 2020, NREA's mandate includes: conducting RE resources assessments; advancing the research, development, demonstration and testing and evaluation of the different technologies; implementing mature technologies; providing education, training, and information dissemination; transferring technology and developing local industry; and testing and certifying RE equipment. Egypt has a high wind regime, estimated to support about 20,000 MW of wind farms, and a countrywide wind atlas will be issued in 2006. Currently, the most promising locations are along the Red Sea. In cooperation with other countries, international donors and agencies, Egypt now has an installed capacity of 145 MW along the Suez Gulf and plans to have 3,000 MW by 2020. In terms of solar thermal energy, Egypt offers

a number of advantages including: high intensity of solar irradiation; large, uninhabited, flat desert areas available at no cost; the existence of an expanded gas pipeline network; and an extended national power grid and regional interconnection. Additionally, the country has a skilled and cheap labor force, and domestic industrial capabilities. With the collaboration and support of other players, Egypt is currently developing its first solar thermal facility with a 150 MW capacity, and by 2020 plans to expand to 750 MW of installed capacity. In the future, Egypt anticipates exporting the green electricity produced from RE to Europe via interconnected transmission lines.

Indonesia

Currently, in Indonesia, there is a massive under use of renewable resources. About 47 percent of households are unelectrified, mainly outside of Java-Bali. These regions are hugely dependent on diesel and fuel oil for generation, with serious negative financial implications. It is also in these regions that the majority of RE resources are located. The Government has issued several decrees and laws supportive of RE, but development continues to be slow. To address this situation, there are a number of activities that have been identified that could scale-up RE in the country. These included: improve policy and regulatory frameworks and develop implementing rules and regulations; determine economically viable RE prospects outside Java-Bali, including accounting for fuel price uncertainties; improve RE resource data quality and data dissemination; strengthen utility capacity; enhance regulatory capacity; and undertake outreach and promotion to the private sector. Indonesia is seeking international community assistance in these initiatives.

Jordan

In the oil-rich area of the Middle East, Jordan stands out for its lack of oil, but abundance of wind and solar resources. The country has a six-month heating season and is feeling the effects of being cut off from cheap oil from Iraq. Jordan is now trying to attract private sector investment to boost renewable and alternative energies, with a focus on off-grid water pumping, wind farms, and energy efficiency. A dedicated fund has been set up to support these efforts. Other activities include: solar water heating expansion; a 1 MW biogas GEF medium-sized project (MSP); a solar pond in the Dead Sea; a Dead-Red canal project to generate 100 MW from hydropower; establishment of wind farms across the Mediterranean region, with interconnection by a transnational grid; a commissioned resource map for the Mediterranean region; and a study on resource mapping, barrier removal and effective policies for the region. The strategy is to achieve 15 percent RE within the next 15 years. Achieving this goal will require large projects that are grid-connected and will necessitate the intervention of organizations such as the World Bank and GEF.

Nigeria

Nigeria has vast RE resources, but only hydro and solar are in significant use for power generation and only hydro is grid-connected. The country plans to expand RE use to 7.1 percent of power generation by 2025, through investments in solar PV systems for off-grid applications, isolated mini-grids, and other grid-connected systems. In order to achieve its RE goals, the country has a number of plans and policies. The National Energy Policy (NEP) tries to aggressively integrate renewables into the national energy mix by providing fiscal incentives, establishing a comprehensive information system on RE, providing labor training, conducting R&D, and establishing a rural electrification fund. The Renewable Energy Master Plan (REMP), which is still to be adopted, was a consequence of the NEP. REMP envisions an economy increasingly driven by renewables, sets targets and timetables for the country, establishes a framework on cross-cutting issues with phased projects that include market development, seeks to increase energy access, aims to enhance

manufacturing capacity, and supports infrastructure development.

The National Electric Power Policy (NEPP) is a component of the ongoing restructuring of the entire economy and incorporates renewables in the generation fuel mix. The Electric Power Sector Reform Act (EPSRA) is the legal consequence of the NEPP. It provides legal backing to, and the process for unbundling; establishes rules for the development of competition in generation and power trading and for the regulation of transmission and distribution; and creates a rural electrification agency and fund for leveraging investments in, and administration of a subsidy for rural electrification. Finally, the Rural Electrification Policy (REP) aims at making reliable electricity available to 75 percent of the population by the year 2020, including utilization of RE resources for at least 10 percent of all new connections. To this point, the country has unbundled its national electric power authority; privatization is underway; an aggressive public investment program has been launched for generation, network extension, and strengthening; and IPP licensing is ongoing. Policy and regulatory provisions which are sensitive to, and address the peculiarities of, grid-connected electricity are yet to be made.

Russia

At present in Russia the proportion of RE use is very small. The current plan is to increase the ratio of RE in total energy supply from 0.1 percent to 1 percent—a 10-fold increase by 2020. Although this represents progress, it is not an impressive figure, and Russia needs to work on more ambitious targets. Energy sustainability was declared a mainstream theme during the Russian presidency of the G8 in 2006 and this includes diversification of energy supply. In addition, renewable resources are considered an important element of an environmental policy aimed at reducing pollution and GHG emissions. Strategic goals for RE include reducing consumption of conventional energy resources, diminishing pressure on the environment, securing sustainable energy supply of regions with non-centralized systems, and decreasing costs of delivered fuel from remote districts. Outstanding barriers to achieving these goals include a lack of rules and regulations for grid-connected installation and high production costs, financial risks, and technical problems with grid connection. To address these barriers, Russia launched the Russian Program for Development of Renewable Energy Sources (RPDRES) with the GEF to make institutional improvements and investment co-financing to stimulate development of RE in the country.

South Africa

South Africa is a country of 44 million people besieged by AIDS and unemployment problems. Coal is the primary fuel (70 percent), with the remainder of total energy consumption met from imported oil. About 92 percent of the country is electrified. Key motivators for RE in the country are: climate change, the need for new capacity to replace retiring coal plants, increased job creation, and the rising price of oil. Challenges to RE include: non-cost reflective tariffs from coal substitution; inequitable spending on R&D, with more going to nuclear than RE; a lack of public information and mixed messages on RE; environmental assessments which are a huge problem in South Africa; and the tremendous turnover of human capacity in the Government and regulatory community. In terms of accomplishments to date, a White Paper on RE policy has been prepared that establishes a target of 10,000 GWh of RE by 2030, or about 4 percent of projected capacity of 41 GW. Further, studies on resource availability indicate that 50 percent of current consumption could come from RE, to include small hydro, landfill gas, solar thermal, and biofuels. In the case of biofuels, South Africa is developing a strategy in this area and will be collaborating with Brazil and Germany on program design. Currently, a subsidy of 14.2 million rands exists to support biofuels. Although very small, it is a start. Regarding the legal

framework in the country, the Electricity Act provides for non-discriminatory connection to the grid, allows the Ministry of Mines and Energy to specify percentage of sources for generation, and gives the regulator a prominent role to play.

Planned activities for RE include: setting up a grid-connected strategy; integrating renewables with the rural development strategy; targeting a 12 percent energy efficiency improvement by 2012; funding RE equity investments; working with Brazil and India on a cooperation framework; enhancing donor coordination; developing the Darwin wind farm demonstration program; exploring green energy trading; and working with GEF and UNDP on a solar water heating program, and GEF and the World Bank on market design technical assistance. Key lessons learned to date are the need to build in sustainability and the realization that policy itself is not enough; it must be linked to follow-on action and implementation.

Tunisia

Tunisia has had an energy policy in place since the 1980s that is based on the development of sustainable hydrocarbon resources, least-cost supply of energy for the whole population, and rational use of energy and promotion of RE. Tunisia has been active in RE and rational energy use for over 20 years, including the establishment of a national energy conservation program, creation of national agency for energy efficiency, energy intensity improvements, and reductions in GHG. Achievements to date include 20 MW of installed wind systems, 1,200 PV households, 200 schools with PV in remote rural areas, 150,000 square meters of solar collectors for hot water, and most notably, 97 percent rural electrification coverage. Tunisia has also established a regulatory framework that includes a 2004 law on energy conservation, and a prioritized national program for conservation and the promotion of RE. In the future, there will be a strong push for wind energy development as preliminary studies show in excess of 1,000 MW of wind potential. Planned activities include the development of 200 MW of wind by 2011; diffusion of large-scale solar water heating, with a target of 500,000 square meters by 2009; scale-up of biomass, PV, and wind pumping; creation of an energy conservation fund; support through incentives and grants, rational consumption, and energy substitution (switch from imports to natural gas); development of a sustainable policy; and a wide information and dissemination campaign on how to save energy. These activities will be implemented through five task forces and will include monthly reports to the President's cabinet. Their success will require partnership, financing assistance, and technology transfer from industrialized countries.

In Summary

Each of the countries addressed in this panel have made commitments to expand the use of RE in their energy mix and most have set targets and timetables for RE development. Several have already put in place policies and regulations to increase the role of renewables, while others are in early stages of policy development and implementation. Market drivers for RE include climate change, EU targets (for EU member countries), rising fossil fuel prices, and job/industry creation. Activities address grid- and off-grid energy needs and include electric, thermal, mechanical, and fuel applications.

Among the key lessons cited by these countries to date are:

- RE resource information is critical; all of the countries have conducted resource assessments or are in the process of doing so.
- Though ongoing research, development and demonstration of RETs is necessary and occurring in many of the countries, only mature technologies should be implemented and these exist in the marketplace today.

- Some of the costs of these technologies remain higher than conventional options, though policies can be put in place to address this. For example, in the case of Croatia, a SBC was collected from consumers to support the costs of a feed-in tariff for RE producers.
- Policies should be routinely reviewed and revised as needed; however, any adjustments should be made in a manner that does not adversely affect investor confidence.
- Public education, training and information dissemination on RE is essential, as is outreach to the private sector. Strengthening the capacity of utilities and regulators in RE is needed and testing and certification of RE equipment is important.
- A range of technologies are being tested and deployed in these countries, including large- and small-scale hydropower, large-scale solar thermal, solar water heating, wind farms, and grid- and off-grid PVs. Many of the countries are also undertaking studies on the potential for biofuels.
- Rules and regulations for grid-connected installation are crucial.
- Donor coordination is key and the support of the international development community, including the World Bank and GEF, has been important in advancing the role of RE in the countries.
- Finally, policies are necessary, but not sufficient; these must be linked to follow-on action and implementation.

11. Closing Session and Wrap-up

The closing session reviewed the highlights of the three-day Forum and outlined next steps for moving forward on the significant momentum generated at this event.

Donor Perspective on Country Plans for Grid-Connected Renewable Energy

There is a cost associated with designing and implementing RE projects and programs in developing countries, and the international donor community has a responsibility to play its part. However, donors want to support the development of a *sustainable* power sector, one that is financially, socially, and environmentally sound. Further, it is the donor role to support the agenda of developing countries, not the wishes of the industrialized world, and the donor agenda should not include technology dumping. Increased RE is good for everybody, and these technologies have an important role to play in the global energy future. However, two key challenges remain. First, how are the incremental costs of RE to be addressed, and what is the appropriate role of the donors and GEF. Second, how can donor funds be used more effectively in a catalytic role to stimulate domestic funding sources for RE, including from consumers who must pay for the service. In general, the energy sector should be a profitable sector that should not require public subsidies if it is working properly; however, in cases where subsidies are warranted to address market imperfections they should be designed to enable, not distort, the sector. Donors have to ask a number of questions to consider support:

- Has the homework in sector reform been done, such as creating a level playing field?
- Is there a good analysis of the status and challenges? Does the country have a strategy?
- Has the country implemented energy efficiency sufficiently? (RE does not make sense if consumption is highly wasteful.)
- Has the country done the math on proposals, including a comparative summary of alternatives?
- Are the proposed programs also addressing poverty? This is an important goal for donors.
- Is there a bias in the country towards large-scale projects? In many instances, small-scale projects may be more realistic, yet financing schemes have to be adopted to deal with these.

RE will be moving up the global agenda. The G8 under Tony Blair gave a big boost to RE and energy efficiency, Russia has committed to advance this platform under its recently assumed G8 leadership, and Germany, as the next G8 presidency, will make RE a priority. There will also be an increase in donor funding for RE projects. From Europe alone discussions are underway regarding an increase in foreign aid at the level of US$10 billion dollars per year, with a large part of this dedicated to

infrastructure, and the World Bank has expressed its increased support levels for RE and energy efficiency. The Government of Germany is also committed to playing its part by working with developing country and international partners in advancing RE on a large scale.

GEF Lessons Learned in Renewable Energy

Since its inception in 1991, GEF's significant investment in RE, estimated at approximately $1 billion, has yielded a number of important lessons learned that are being internalized and resulting in modifications to the way GEF is doing business in this area. First, based on its broad mission and mandate, GEF's approach to RE needs to be strategic and concentrate on catalyzing sustainable RE market development; GEF is not in a position to simply fund all costs associated with RE deployment. Second, while GEF money has been used for demonstration projects in the past, the emphasis in the future will be on scaling-up the use of renewables, for example through the smart use of policies and power sector frameworks. Third, local finance is important and GEF resources can help to leverage and facilitate this funding. In that sense, GEF needs to find ways to more aggressively bring private sector financing to the table. And finally, RE needs to be seen as a means to an end which, from the GEF point of view, is to stabilize the GHG concentration in the atmosphere.

Meeting Highlights

The excellent work of the conference organizers, sponsors, and forum participants was acknowledged, and the importance of keeping the lines of communication alive was highlighted. Among the main conclusions from the Forum were the importance of implementing appropriate laws, having the necessary planning tools to account for the individual characteristics of all energy sources, and establishing related regulatory entities. Much work remains to be done in assessing the resource base and valuing this accordingly. Engaging the private sector is also key, necessitating long-term contracts and prices. Multilateral, private finance, and development entities must strengthen their work and share experiences, with governments playing the important role of bringing together and serving as point of contact to all. In the case of Mexico, the main challenges include: developing an appropriate set of laws and ensuring they are implemented/enforced; creating methodologies to evaluate capacity; creating net metering; determining the economic value of renewables for risk reduction; and stabilizing the grid network. Mexico also needs to intensify the mapping and assessment of resources and improve land zoning to avoid speculation and environmental impacts. Finally, there is a need in the country to provide incentives to IPPs, small power producers, and self-generators to encourage renewable development.

Forum Wrap-up and Next Steps

The Ministry of Energy of Mexico was recognized for hosting the Forum and the GEF, the World Bank, ESMAP and GWEC were acknowledged as sponsors of the Forum which had proven to be extremely useful and informative. His Excellency Minister Clariond had opened the meeting by challenging the audience on the relatively high costs of RE (despite their favorable environmental and social benefits), and over the next three days speakers and participants addressed this challenge. During the Forum three key drivers for RE development continued to emerge—energy security, a cleaner environment, and economic development. The major lessons learned during the three-day meeting included: RE accounts for only one-sixth of total energy supply, primarily from hydropower and traditional biomass; renewables are making a difference, yet there is much room for growth; countries should develop technology neutral solutions that match local demand with local supply capacity; and RE in developing countries must focus on commercial technologies.

Ms Sierra indicated that there are a range of policy options for advancing renewables, and no one solution fits all. This notwithstanding, feed-in tariffs appear to be emerging as a competitive mechanism to produce high penetration rates in a short period of time, while creating local manufacturing and jobs. RPS and tendering policies are other policy options being pursued by a number of countries, yet these have not had the impact of the feed-in approach. In addition to policy instruments, a range of financial instruments exist for RE, yet gaps remain in terms of long-term financing, debt/equity, and risk mitigation. Finally, the resources of the World Bank were committed to further advancing efforts in RE, and to making the world a better place.

12. Conclusions

The Forum addressed four key issues over the three days. **Opportunities** for grid-connected RE, outstanding **barriers** to the technologies, **lessons learned** in the policy area, and **where do we go from here**?

Opportunities for Grid-Connected Renewable Energy

RE is a market segment that warrants significant attention and provides enormous **opportunities**. Three key market drivers were identified, providing the pillars for RE scale-up.

First, advancing *energy security*, by diversifying a country's energy mix and reducing the impact of fossil fuel price uncertainty. This can lead to power plant portfolios that are optimized in terms of risk and costs.

Second, helping to ensure a *cleaner environment* and reducing carbon dioxide and other harmful emissions. IEA reported that a "business as usual scenario" in the energy sector will result in an increase of CO_2 emissions of more than 50 percent in the next 25 years. RE offers a clean, versatile in scale, "no-regrets" climate change mitigation solution.

Third, stimulating *economic development*, to include developing markets, building industries, generating jobs and incomes, and reducing poverty.

Countries documented the impact that RE is making in reducing emissions, decreasing dependence on fossil fuels, and improving energy security. Several speakers highlighted that RE is good business, can be profitable, and is boosting economies in the short-, medium-, and long-term. Spain described the positive impact of RE in direct and indirect job creation, particularly in the industrial, agricultural, transport and service sectors; in small- and medium-scale enterprises; and often in low income regions. Germany announced that the country's reliance on RE for 11 percent of total generation has enabled local utilities to maintain consumer price levels despite rising fossil fuel prices.

Barriers to Grid-Connected Renewable Energy

Despite their significant benefits, RE technologies continue to confront a number of **barriers**. Among those barriers, highlighted during the Forum, were:

- Lack of favorable policy, regulatory, legal frameworks, and planning practices to encourage development of and investment in renewables.

- Energy prices that do not reflect the social and environmental costs of energy, and massive subsidies that exist for fossil fuels. It was noted that RE would not require special support if these market distortions were addressed.

- Inadequate institutional capacity for various aspects of RE project and program design, development, and implementation.
- Insufficient access to long-term financing, seed capital, and financial risk mitigation instruments.
- Inadequate information on the RE resource potential and intermittency issues of some renewables.
- The unusual cost-revenue structure of renewables (high investment costs, low O&M costs, and steady benefits that depend on mainly on external factors, like intermittent energy supply and dispatch conditions).
- Knowledge gap by many developing country decision-makers on the policy experiences of countries that have put in place effective policy and regulatory frameworks, including the range of available approaches, tools, and instruments. Also, lack of consumer understanding of the benefits of RE.
- Finally, an issue that will become more prominent as RE accounts for a larger portion of total generation mix is integration into the electricity system. This issue is already occurring in countries like Denmark, Spain and Germany where RE comprises a significant share of electricity supply.

Further, developing country participants noted that, unlike their counterparts from OECD nations, they confront a number of additional challenges in scaling-up RE at the grid-level. These related to power sector policy frameworks and regulation, governance practices, lack of private sector interest, infrastructure quality, and income levels and ability to pay.

Table 12.1 identified some of the proposed solutions identified over the course of the Forum for mitigating these barriers.

Key Findings and Lessons Learned

A number of **findings and lessons learned** emerged during the Forum.

One-sixth of global energy comes from renewables, however, this is primarily traditional biomass and hydropower. Other RE technologies are growing rapidly, though they are starting from a small installed base. According to the IEA, under the business-as-usual scenario, RE generation will increase six-fold through 2030, but the overall percentage of total generation will remain low at only 2 percent. Fossil fuels continue to be the dominant energy source, despite negative environmental and energy security consequences. More aggressive policies to promote "no regrets" solutions such as RE can help address security issues and provide a pathway for global climate change mitigation.

RE is making a difference. At least 48 countries have RE policies in place and the list is growing, yet the impact of such policies in terms of installations is highly concentrated. Five countries account for 85 percent of global installed RE capacity. And, interestingly, these five countries do not necessarily have the best RE resources. The difference is that they have strong policy and regulatory frameworks. Further, though the bulk of the RE development has been in industrialized countries to date, an increasing number of developing countries are putting aggressive programs and policies in place.

RE "technology push" approaches are not appropriate. Solutions should be matched to the local resource base, market conditions and country priorities. All RE options should be considered, including large-scale hydropower.

In the case of developing countries, the focus must be on commercial technologies with proven performance as they cannot afford to be a test bed for unproven options.

Table 12.1: Barriers and Solutions to Increase Grid-Connected Renewable Energy

Barriers	Proposed Solutions
Lack of Favorable Policy/ Regulatory Climate	• Government commitment and actions to set clear policy goals/planning for the power sector • Build on experiences of other countries to put in place policies, regulations, and/or incentives to promote RE • Require guaranteed access to grids, and long-term secure payment • Power sector reform should consider RE upfront • Match instruments to local needs, conditions, power sector structure • Private sector needs to mobilize/engage in policy debate and make a better case for RE
Market Distortions that Bias Against RE	• Eliminate fossil fuel subsidies • Improve valuation of RE through improved planning tools to account for portfolio diversification value, hedging, and externalities
Inadequate Institutional Capacity	• Strengthen capacity of regulators, utility planners, energy agencies • Strengthen utility planning tools to account for RE
Knowledge Gap on Policy Approaches/Impacts	• Improved knowledge sharing between countries that have implemented RE policies and those in process • Improved documentation/sharing of lessons learned and best practices (e.g., World Bank RE toolkit, REN21)
Lack of access to Financing	• EU, World Bank, regional banks, bilateral organizations (e.g., KfW) are increasing financing for RE/EE • Export Credit Agencies extending terms for RE to 15 years • Emergence of dedicated RE funds at country and state levels financed through System Benefits Charge • Outstanding need for better engagement of local financial institutions, risk sharing/mitigation instruments, seed capital, long term debt/equity • More effective use of public funds to leverage private investment • Carbon finance is playing a catalytic role; need streamlined mechanisms to introduce RE into the carbon trading market
Lack of Resource Data	• Collect better quality resource data (through SWERA and other mechanisms) and improve access to this information
High Transaction Costs	• Standardization of documentation—PPAs, contracts, etc. • Ease of permitting restrictions, bureaucracy, red tape (e.g., "one shop windows" for clearance intervention • Adopt wholesale approach—bundle small-scale projects together
Intermittency/Integration of RE into Electricity System	• Further investigation of grid integration issues • Real time metering; time and location dependent pricing/tariffs; and regulations policies that allow for these models • Smart energy systems

There is a need for ongoing RD&D and technology innovation to continue to bring the costs down and efficiencies up and to expand the product base.

Analysis of natural resources and power generation portfolios with appropriate risk adjustment techniques often leads to the recognition that in most countries there are

economically and financially cost-effective niches for RE.

With respect to RE policies a number of important points were made and reinforced over the course of the three-day meeting.

Several examples were provided where the costs are competitive or least cost, and projects and programs are moving forward. Other examples were presented for countries such as Vietnam and Croatia where RE is least cost but market, institutional, or other barriers are preventing the projects from moving forward. In still other instances, the technologies are not least cost, but the favorable environmental, security and economic benefits they offer are not accounted for in the marketplace. Policies and other mechanisms can address these barriers, and value the externalities, to enhance the competitiveness and uptake of RETs. Eliminating market distortions such as fossil fuel subsidies, as has been done in Indonesia, can be one of the most effective policy instruments for leveling the playing field for RE.

Traditional financial analysis, based on discounted cash-flow accounting undervalues future fuel price risks and ignores the environmental and health costs of fossil-fuel power plant emissions. A number of cases were provided on ways to enhance the value of RE through more effective planning, portfolio diversification and free hedging, and incorporating environmental and health externalities. However, it was also noted that though these mechanisms are emerging, they need broader acceptance and adoption.

Energy sector reform can serve as an important means for addressing market barriers and increasing deployment of renewables, as has been experienced in countries such as China and South Africa. In these cases, power sector reform is opening up competition and expanding opportunities for energy-service providers and entrepreneurs that had not existed under prior Government-owned and -operated utilities. However, designing power sector architectures should consider RE up-front; it is much harder to incorporate these technologies after the fact.

The Forum looked at RE in a vertically integrated system versus an unbundled system. In general, it found that in a vertically integrated system there are economies of scale and economies of scope, the amount of RE capacity is determined by a monopoly that may be resistant to change, and there is very little sensitivity to risk. In an unbundled system there is competition, the rules are set by the market allowing for more flexibility, increased opportunities exist for private generators, however, they may need special treatment to participate. The independent system operator (ISO) implements policies set by Government, and each actor has to manage his/her own risk. Under both structures long-term contracts are needed for the power producers and "cookie cutter" solutions should be avoided; each case should be assessed individually.

Twenty-five years of experience has demonstrated clear factors for successful policies. They must be long-term and consistent; have a secure and predictable payment mechanism; provide fair and open access to the transmission grid; possess good governance conditions and administration procedures with low transaction costs; have strong public acceptance and support; and enforcement is key. Countries should start simple in the design of energy policies, and as repeated in several presentations—"the devil is in the detail".

A wide range of policy options exist for advancing RE. Some clear differences were presented between the various policy options and the results they yield. For example:

- *Feed-in laws* produce high penetration rates in a short period of time, create local manufacturing, provide strong incentives for private investment, can be cost-effective if the tariff is periodically and wisely adjusted, and overall are the most simple to design, administer, enforce, and contract. *The highest installation figures have been achieved with this policy model and investors prefer this*

mechanism due to its price stability. Feed-in laws provide a pre-determined off-taker price; power distributors and retailers must take power from eligible facilities; they are focused on new and emerging technologies; and have varying methods of setting price. Feed-in success factors include long-term contracts (15-20 years); guaranteed buyers under standard contract; tariffs that give a reasonable rate of return; and flexibility to capture cost efficiencies. A recent study of the European Commission found that "feed-in tariffs are cheaper and more effective than quota systems (e.g., RPS) because they give high planning and investment security, are easy to handle, and involve low transaction costs". The report also reinforced the importance of well-designed regulations.

- *Renewable Portfolio Standards* are quantity-based via Government mandate; focus on emerging and new RETs; and provide a requirement on wholesale or retail market participants (utility or grid company). Attributes of the RPSs are that they can meet realistic RE targets if strongly enforced; can reduce cost and price with competitive bidding; can reduce investor risk with a PPA; and can be more politically and economically sustainable as they are "market-based" policies. The RPS favors least-cost technologies but diversity is possible with separate technology targets or tenders. Quota systems with tradable certificates can create two markets—one for power and one for the green value of energy. In general, the RPS approach is more complex to design and administer than the feed-in tariff, potentially adding to costs.

- *Tendering policies* involve a Government-sponsored competitive bidding process for RE. In the case of tendering, the lowest priced projects are awarded contracts; contract guarantees take all power generated at a specified price over a fixed time period; the Government pays the incremental cost of RE; and they are usually combined with other policies, e.g. Public Benefit Funds. Tendering is good at minimizing cost, but ensuring that signed contracts are secured is a key challenge. Like the RPS, tendering favors the least-cost solution though it is relatively easy to have separate bidding categories or separate solicitations for different technology groups. If a solid resource planning process exists with competitive bidding to acquire the resources identified in the planning process, this is probably the most sustainable market approach. Finally, tendering tends to be more administratively complex than feed-in tariffs, which can add to the cost.

All three approaches—feed-in laws, RPS, and tendering—can support investor requirements and be designed to reduce risk. They can also be structured to pass cost on to the consumer, and need to address grid interconnection. However, because feed-in laws offer a predictable price and PPA, this gives investors the greatest level of certainty. Consistent policies that account for investor behavior are crucial.

Each of the policy mechanisms discussed has pros and cons. The approach/approaches taken depend(s) on the specific goals and objectives to be accomplished, the socio-economic context, and the power sector structure. There is no one-size-fits-all solution, and what you start with may not be where you end up, so monitoring is important.

In addition to policy instruments, a range of financial incentive policies were identified for country consideration. These included tax credits, accelerated depreciation, capital subsidies, concessional loans, and carbon credits. Many of the successful financing instruments available, like revenue-enhancements, soft lending programs and partial credit guarantees, have been designed as part of the enabling environments and can be fully adapted to the respective policy instruments chosen, e.g. in tenure, scope, and scale.

Experience demonstrated that output-based incentives are generally preferable to investment-

based incentives for grid-connected RE. This is because the investment-based mechanisms do not provide incentives to generate electricity or maintain the performance of the RE plants once they are installed, while the output-based incentives promote the desired outcome—generation of electricity from RE.

Covering the incremental cost of RE and the funding of the various policy measures was a major topic of discussion during the meeting. The most frequent approaches cited were passing the costs onto consumers through a systems benefits charge (SBC), imposing a carbon tax on fossil fuel, and setting up a dedicated fund financed directly by the Government or with donor support.

Though funding sources exist for RE through developing country governments, local financial institutions, multilateral and bilateral organizations, dedicated funds, and others, gaps remain. Attention is needed in the areas of long-term financing, project development and seed capital, debt/equity gaps, and risk mitigation instruments. Carbon finance can play a significant role as the market evolves.

Various models of public-private partnership for financing RE exist. In general, public sector funds must be highly targeted to catalyze, not displace, private capital. Public funds can be used to support infrastructure development such as loans and equity investment in companies and projects, business development, marketing campaign, technical assistance, research and development, standards development, and public awareness.

To scale up RE investment, mobilizing local financing sources is the key. The local banks, however, are not familiar with RE projects, perceive them as high risk with high transaction costs, and usually do not offer long-term financing to match the long pay-back period of RE projects. The Forum identified a list of options to address these issues such as standardized lending documents, banker training, using mezzanine finance, and employing risk mitigation instruments and guarantees.

A sound enabling environment of policy and regulatory framework for RE is the key for private sector participation in the RE sector. Long-term price stability through long-term PPAs with transparent and adequate pricing is the most important factor. The private sector favors the feed-in tariff as the most effective policy for fostering RE, because it provides a guaranteed off-take price and opens the market for a diverse range of technologies. Tax incentives are also cited as important policy instruments.

Policy activities in support of RE are not just occurring at the national level. Several countries have strong policies and programs at the state and local levels that are driving the markets for these technologies.

Next Steps

Regarding next steps, a number of follow-on activities were discussed.

Several developing countries reported on programs and plans to escalate their RE efforts in the near term. These included Croatia, Egypt, Indonesia, Jordan, Nigeria, South Africa, Russia and Tunisia.

The World Bank, GEF, ESMAP and IFC agreed to provide follow-up financial support and technical assistance to help these countries develop appropriate policies, programs, plans, and secure needed resource data and planning tools.

Countries more advanced in RE policy formulation, including those from Europe, the US, Mexico, Brazil, India and others, offered continued information exchange and dialogue to accelerate adoption of more effective policies overall. Particular reference was made to a report recently issued by the EU in December 2005, entitled *The Support of Electricity for Renewable Energy Sources*. This document provides an up-to-date and thorough inventory of experience gained in the application of different mechanisms used in EU Member States for supporting electricity from RE. These were classified into four groups: feed-in tariffs, green certificates, tendering systems, and tax incentives.

Private sector participants, including Enel, Iberdrola, EDF, Acciona Energy, MesoAmerica Energy and Econergy, indicated their strong interest in financing RE projects, in countries that offer clear, stable, long-term policy and regulatory regimes.

Bilateral governments (e.g., Germany, other European Countries, the US, etc.); multilateral programs, including UNEP and SWERA; partnerships such as REN21, the Global Network on Energy for Sustainable Development (GNESD), and the Global Village Energy Partnership (GVEP); research organizations, such as ECN and the National Renewable Energy Laboratory; trade associations and others offered technical assistance, support and information to help countries develop appropriate policy and regulatory frameworks and expand their RE capacity. For example, it was noted that the G8 have increased their support for RE and energy efficiency and this will continue. From Europe alone there will be an increase in aid coming at the level of US$10 billion dollars per year, with a large part of this dedicated to infrastructure and energy.

Finally, as one speaker stated, the key next step is to "shift the grounds for debate—the question is no longer *if* RE, but *how much*". There is a role for all of the key stakeholders to make this happen: governments to set national goals and policies; regulators to enforce these goals; donors to support capacity and technology transfer; the private sector to deliver products, service, promotion and investment; and the financial sector to invest in the future.

Appendix I
Agenda

International Grid-Connected Renewable Energy Policy Forum
Hotel Camino Real, Mexico City, Mexico, February 1-3, 2006
www.gridre.org

Agenda

January 31, 2006
16:00-21:00 Forum Registration
20:00 Welcome Dinner for International Participants

Day 1, Wednesday, February 1, 2006
08:00 Forum Registration

9:00-10:30 Session 1: Opening

Chair: HE Fernando Canales Clariond, Minister of Energy, Mexico

Renewable Energy in Mexico: Progress and Plans, *HE Fernando Canales Clariond, Minister of Energy, Mexico*

Meeting Energy Security and Environment Challenges: The Crucial Role of Renewable Energy Policy, *Ms Kathy Sierra, Vice-President, Infrastructure, The World Bank*

Renewable Energy and Climate Change, *Mr Leonard Good, Chief Executive Officer, Global Environment Facility*

Renewable Energy Development in Germany, *Mrs Astrid Klug, Parliamentarian, State Secretary for the Federal Ministry for Environment, Nature Conservation, and Nuclear Safety, Germany*

The Need for Renewable Energy Policy Frameworks in Developing Countries, *Mr Arthouros Zervos, Chairman, Global Wind Energy Council and Vice-Chairman, REN 21*

Questions and Answers

10:30-11:00 Press Conference/Coffee Break

11:00-13:30 Session 2: Challenges and Prospects of Grid-Connected RE – Global Perspectives and Country Case Studies

Chair: Mr Jamal Saghir, Director, Energy and Water, The World Bank

Renewable Energy in the Future Energy Supply, *Dr Fatih Birol, Chief Economist, International Energy Agency*

Power Sector Architecture and Renewable Energy Policy and Planning, *Mr Chris Flavin, President, Worldwatch Institute*

Achievements and Lessons Learned in RE Policy Development:

Ms Laura Porto, Director of Renewable Energy, Ministry of Mines and Energy, **Brazil**

Mr Debashish Majumdar, Acting Managing Director, Indian Renewable Energy Development Agency, **India**

Dr Juan Mata, Director General for Environment, Technology Development, and Research, Ministry of Energy, **Mexico**

Lic José Gil López, Head of Cooperation Projects with Latin America and Asia, Instituto para la Diversificación y Ahorro de la Energía (IDAE), **Spain**

Questions and Answers

13:30-15:00 Luncheon

15:00-16:00 Session 3: Renewable Energy in Different Institutional Power Sector Frameworks

Chair: Anil Cabraal, Senior Energy Specialist, The World Bank

Mexico: State-owned Fully-Integrated Utility, *Ing Eugenio Laris Alanís, Vice-President for Financed Generation Projects, Comisión Federal de Electricidad*

United Kingdom: Renewable Energy Development under Fully Privatized Market, *Dr Catherine Mitchell, Senior Principal Research Fellow at the Centre for Management Under Regulation, Warwick Business School, University of Warwick, UK*

Indonesia: Small Power Producer Program, *Ms Maritje Hutapea, Head of Sub-Directorate of Energy Utilization Organization, Directorate General Electricity and Energy Utilization, Department of Energy and Mineral Resources*

Questions and Answers

16:00-16:30 pm Coffee Break

16:30-18:30 Session 4: Valuation of Renewable Energy

Chair: HE Ridha Ben Mosbah, Secretary of State, Ministry of Industry, Energy, and Small and Middle Enterprises, Tunisia

Utility Planning and the Renewable Energy Supply Curve, *Dr Peter Meier, Consultant, Switzerland*

Portfolio Diversification and Free Hedging, *Dr Shimon Awerbuch, Senior Fellow Science and Technology Research (SPRU), University of Sussex, UK*

Valuing the Capacity Contribution of Intermittent Sources*, Gitte Agersbaek, Engineer, Danish Transmission System Operator*, *Denmark*

Importance of Credible Resource Information: Solar and Wind Energy Resource Assessment, The SWERA Program, *Ing Marta Rivera, SWERA Guatemala*

Questions and Answers

18:30-18:45 Session 5: Wrap Up for Day 1

19:00-20:00 Reception Hosted by the Global Environment Facility and The World Bank

Day 2, Thursday, February 2, 2006

9:00-11:30 Session 6: Renewable Energy Policy Instruments

Chair: Mr Juan Legisa, Coordinator, Advisory Council to the Secretary of Energy and Academic Director of the CEARE (Center of Studies of the Energetic Regulatory Activity), Argentina

Mandated Market Policy Overview, *Dr Jan Hamrin, President, Center for Resource Solutions:* To include discussion of mandatory price or quantity, feed-in tariffs, Renewable Portfolio Standards, competitive tendering mechanism, etc.

Panelists:
Germany: Feed-in Tariff Law, *Dr Volker Oschmann, Deputy Head of Renewable Energy Law Division, Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, Germany*
California's Competitive Tendering Mechanism, *Mr Dan Adler, Director, Technology and Policy Development, California Clean Energy Fund*
Financial Incentive Policy Overview, *Dr Wolfgang Mostert, Consultant, Denmark:* To include discussion of performance-based vs. investment-based, capital subsidies, tax credits, etc.

Panelists:
US Federal Production Tax Credit and other Incentive Policies, *Ms Larissa Dobriansky, Deputy Assistant Secretary, Office of National Energy Policy, US Department of Energy*
Netherlands Experience in Grid-Connected Renewable Energy Policies, *Dr Gerrit Jan Schaeffer, Energy research Center of the Netherlands (ECN)*

11:30-12:00 Coffee Break

12:00-14:00 Session 7: Renewable Energy Public Financing and Planning: Stakeholder Perspectives

Chair: Mr Vladimir Maksimov, Adviser, Ministry of Economic Development and Trade, Russia

Sustainable Energy Financing, *Mr Eric Usher, Head, Renewable Energy and Finance Unit, United Nations Environment Programme*

Public-Private Partnerships for Investing in Renewable Energy - US State Renewable Energy Funds, *Mr Lewis Milford, Executive Director, Clean Energy States Alliance, US*

KfW Experience in Financing Grid-Connected Renewable Energy, *Mr Ulrich Schoppmeyer, Director, KfW in Central America and Mexico*

Improving Rural Electrification with World Bank Support, *Mr Pedro Villa Durand, Manager, World Bank Rural Electrification Project*

The Role of Carbon Finance in Accelerating Grid-Connected Renewable Energy, *Mr Fernando Cubillos, Senior Technical Specialist, Carbon Finance Group, The World Bank*

14:00-15:00 Luncheon

15:00-17:45 Session 8: Breakout Groups

15:00-16:45 Breakout Groups

Participants will be divided into working groups to address a set of pre-defined questions/issues. The objective is to provide an opportunity for those countries with interests and plans to develop renewable energy policies to interact and learn from others that have done it. A facilitator and rapporteur will be assigned for each group.

Breakout Group Sessions Include:

Renewable Energy and Power Sector Reform

-Charles Feinstein, Moderator

-Marta Rivera, Rapporteur

Mainstreaming Renewable Energy into Power Sector Planning

-Anil Cabraal, Moderator

-Claudio Alatorre Frenk, Rapporteur

Renewable Energy Policy Instruments

-Griffin Thompson, Moderator

-Alvaro Rios, Rapporteur

Mobilizing Local Financing

-Eric Usher, Moderator

-Antonio Huerta, Rapporteur

Coffee to be provided during breakout groups.

16:45-17:45 Breakout Group Reports

Breakout Group Rapporteurs to present summary of group discussion (10 minutes each)

17:45-18:00 Session 9: Wrap Up Discussion for Day 2

20:00 Dinner Hosted by the Federal Electricity Commission of Mexico

Day 3, Friday, February 3, 2006

9:00-11:00 Session 10: Round-table on Private Sector Investment

Chair: Morgan Landy, Manager, Renewable Energy and Public Private Partnerships, International Finance Corporation

Private Sector Participants will respond to questions/issues raised by policy makers over the prior two days. (Additional private sector representatives may participate as well.)

Mr Francesco Giorgianni, Head European Affairs, Public and Regulatory Affairs, Enel, Belgium

Mr Tomas Guijarro, Director de Desarrollo de Negocios Latinoamérica,

Iberdrola, Mexico

Dra Cintia Angulo de Leseigneur, Presidenta, EDF México

Mr Melchor Ruiz, Director for Latin America, Acciona Energia SA, Spain

Mr Jay Gallegos, Chief Operating Officer, MesoAmerica Energy, Costa Rica

Mr John Paul Moscarella, Executive Vice-President and Manager, Econergy International/Clean Tech Fund, Mexico

Mr S Chandrasekhar, Managing Director, Bhoruka Power, India

Questions and Answers

11:00-11:30 Coffee Break

11:30-13:30 Session 11: Round-table Discussion: Moving Forward on Scaling-up Grid Connected Renewable Energy

Chair: Ms Susan Goldmark, Energy Sector Manager, Latin America and the Caribbean, The World Bank

Country Plans for Developing and Implementing RE Programs and Policies *(10 minutes each)*

Mr Zeljiko Tomsic, Assistant Minister, Ministry of Economy, Labour and Entrepreneurship, Croatia

Eng Khaled Mohamed Fekry, General Manager of Bioenergy Department, New and Renewable Energy Authority, Egypt

Ms Maritje Hutapea, Head of Sub-Directorate of Energy Utilization Organization, Directorate General Electricity and Energy Utilization, Department of Energy and Mineral Resources, Indonesia

Mr Malek Kabariti, President of the National Energy Research Center, Jordan

Prof Onwuamaeze Casmir Iloeje, Chairman, Nigerian Electricity Regulatory Commission, Nigeria

Mr Vladimir Maksimov, Adviser, Ministry of Economic Development and Trade, Russian Federation

Mr Andre Otto, Deputy Director of Department of Minerals and Energy, South Africa

HE Ridha Ben Mosbah, Secretary of State, Ministry of Industry, Energy and Small and Middle Enterprises, Tunisia

Donor Perspective on Country Plans for Grid-Connected Renewable Energy, Mr Manfred Konukiewitz, Head, Division Water, Energy, Urban Development, Federal Ministry for Economic Cooperation and Development, Germany

Questions and Answers

Closing Remarks, *Lic Carlos Garza Ibarra, Deputy Secretary for Energy Policy and Planning, Ministry of Energy, Mexico*

Summary, *Ms Kathy Sierra, Vice-President, Infrastructure, The World Bank*

Meeting Adjourned!

Appendix II
Participant List

International Grid-Connected Renewable Energy Policy Forum - Participants List

Ms Alicia Baragatti
Directora Nacional de Promoción
Ministry of Energy
Paseo Colón 171 - 4° Piso . of. "411"
Buenos Aires, Argentina
Phone: (54-11)4349-8008
Fax: (54-11)4349-8482
E-mail: abarag@mecon.gov.ar

Mr Jorge Alberto Bauer
Ingeniero
Secretaria de Energia
Paseo Colón 171 - 4° Piso - "401"
Buenos Aires, Argentina
Phone: (54-11)4349-8008
Fax: (54-11)4349-8482
E-mail: jbauer@minplan.gov.ar

Mr Juan Legisa
Coordinator, Advisory Council to the Minister
Ministry of Energy
Argentina

Ms Monica Amelia Servant de Ferrara
Licenciada
Secretaria de Energia
Paseo Colón 171 - 4° Piso - of. "411"
Buenos Aires, Argentina
Phone: (54-11)4349-8008
Fax: (54-11)4349-8482
E-mail: mserva@mecon.gov.ar

Mr Samvel Arabajyan
Commissioner
Public Utility Regulatory Commission
#22 Saryan ST.
Yerevan, Armenia
Phone: 37410 566702
Fax: 37410525563
E-mail: samvel@psrc.am

Mr Tigran Gnuni
Director, Energy Strategy Center
Ministry of Energy
5/1, Myasnikyan av., 375025
Yerevan, Armenia
Phone: (374 10) 581 156
Fax: (374 10) 542 468
E-mail: tigran.gnuni@energinst.am

Mr Francesco Giorgianni
Head European Affairs, Public and
Regulatory Affairs
Enel
Brussels, Belgium
Phone: 32-2-211-0224
E-mail: francesco.giorgianni@enel.it

Ms Angelika Pullen
Policy Officer
Global Wind Energy Council
26 Rue Du Trone 1000
Brussels, Belgium
Phone: +32 2502 5502
Fax: + 32 2 546 1944
E-mail: ap@gwec.net

Mr Arthouros Zervos
President
Global Wind Energy Council and REN 21
26 RUE DU TRONE 1000
Brussels, Belgium
Phone: +32 2502 5502
Fax: +32 2 546 1944
E-mail: zervos@fluid.mech.ntua.gr

Ms Laura Cristina da Fonseca Porto
Ministry of Energy and Mines
Esplanada dos Ministirios,Bloco U
7: Floor-Suite 926
CEP.70.065.900
Brasilia, Brazil
Phone: (55 61) 3319 5811
Fax: 61 9976 3150
E-mail: lporto@mme.gov.br

Mr Fayez Malek
Energy Specialist
CIDA
Canada
E-mail: FAYEZ-A_MALEK@acdi-cida.gc.ca

Mr Edigson Enrique Pérez Bedoya
Director General
IPSE
Cra. 12, 84 - 12 Piso 9
Colombia
E-mail: direccion@ipse.gov.co

Mr Luis Carlos Rubiano Ortegón
Subgerente Planeación
Empresas Públicas de Medellín
Carrera 58 # 42-125 Oficina 9-066
Medellín (Antioquia), Colombia
Phone: +57 (4) 3804230 – 3804320
Fax: (+)57 (4) 380 67 95
E-mail: lrubiano@eeppm.com

Mr Henry Josué Zapata Lesmes
Unidad de Planeación Mienero Energética, Ministerio de Minas y Energía, Colombia
Carrera 50 No. 26-00
Bogotá D.C., Colombia
Phone: 3245210
Fax: 3150306
E-mail: henry.zapata@upme.gov.co

Mr Jay Gallegos
Chief Operating Officer
MesoAmerica Energy
Costa Rica

Mr Nenad Debrecin
Professor, Department of Power Systems
Faculty of Electrical Engineering and Computing
University of Zagreb
Unska 3
10000 Zagreb, Croatia
Phone: 385 1 6129 907
Fax: 385 1 6129 890
E-mail: nenad.debrecin@fer.hr

Mr Zeljko Tomsic
Assistant Minister
Ministry of Economy, Labour
and Entrepreneurship
Ulica grada Vukovara 78
10000 Zagreb, Croatia
Phone: 385 1 610 6113
Fax: 385 1 610 91 13
E-mail: zeljko.tomsic@mingorp.hr

Mr Gitte Agersbaek
Engineer
Energinet.dk
Fjordvejden 1-11 7000
Fredericia, Denmark
Phone: +45 76 22 42 10
E-mail: gia@energinet.dk

Mr Wolfgang Mostert
Director
Dalparken 6
2820 Gentofte, Denmark
Phone: 4539636131
Fax: 4539636131
E-mail: wolfgang@mostert.dk

Mr Alvaro Ríos Roca
Executive Secretary
Organización Latinoamericana de
Energía (OLADE)
Av. Mariscal Sucre N58-63 esq. Fernández Salvador
Quito, Ecuador
Phone: (5932) 2531674
Fax: (5932)2531691
E-mail: jjcastro@olade.org.ec

Eng Khaled Mohamed Fekry
General Manager of Bioenergy Deptt
New & Renewable Energy Authority (NREA)
Egypt
Fax: +202 2717173
E-mail: khfekry@nreaeg.com

Mr Fatih Birol
Chief Economist
International Energy Agency
France
Phone: +33 (0) 1 40 57 66 70
Fax: +33 (0) 1 40 57 66 59
E-mail: fatih.BIROL@iea.org

Mr Eric Usher
Head, Renewable Energy and Finance Unit
UNEP
Tour Mirabeau
39-43 quai Andre Citroen
Paris, France
Phone: 33 144377614
Fax: 33 144371474
E-mail: eric.usher@unep.fr

Mr Daniel Argyropoulos
Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety (BMU)
Alexanderplatz 6
10178
Berlin, Germany
Phone: +49 1888 305 3647
Fax: +49 1888 305 3649
E-mail: daniel.argyropoulos@bmu.bund.de

Mrs Astrid Klug
Parliamentarian State Secretary
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Alexanderplatz 6
10178
Berlin, Germany
Phone: +49 - 1888 305 - 2032
Fax: +49 - 1888 305 - 2039
E-mail: astrid.klug@bmu.bund.de

Dr Manfred Konukiewitz
Head, Division Water, Energy, Urban Development
BMZ
Adenauerallee 139 - 141
53113
Bonn, Germany
Phone: +49 (0)1888 535-3783
Fax: +49 (0)1888 10 535-3783
E-mail: konukiew@bmz.bund.de

Mr Volker Oschmann
Deputy Head Renewable Energies - General Affairs Division
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Alexanderplatz 6
11055
Berlin, Germany
Phone: -6962
E-mail: volker.oschmann@bmu.bund.de

Mr Michael Wegner
Germany

Mr Arne Wolf
Consejero
Embajada de Alemania
Lord Byron # 737
Col Polanco
11560 México, D.F.
Germany
Phone: +52 55 52832249
Fax: +52 55 52812588
E-mail: arne.wolf@diplo.de

German Antonio Juárez Vidaurre
Msc. Ingeniero Electricista
Comercializadora Eléctrica de Guatemala, S.A. (COMEGSA)
6ta Avenida 8-14 Zonal
Ciudad de Guatemala, Guatemala
Phone: (502) 2420 4200 extension 2352
Fax: (502) 2230 5618
E-mail: gjuarez@comegsa.net

Ms Marta Ximenez de Rivera
Director
Solar and Wind Energy Resource Assessment
Guatemala
E-mail: martaxrivera@hidroelectrica-rhsa.net

Mr S Chandrasekhar
Managing Director
Bhoruka Power
India
Phone: +91 80 22273285
Fax: +91 80 22245246
E-mail: sekhar@bhorukapower.com

Mr Debashish Majumdar
Managing Director
Indian Renewable Energy Development Agency
India
E-mail: d.majumdar@iredaltd.com

Ms Maritje Hutapea
Head of Energy Utilization Division
Directorate General of Electricity and Energy Utilization, Ministry of Energy and Mineral Resources , Republic of Indonesia
Jl.HR.Rasuna Said, Blok X-2, Kav. 7-8 Kuningan
Jakarta Selatan - Indonesia
Indonesia
Phone: 62-21-5229373
Fax: (6221) 525 6044 - 525 6066
E-mail: mhutapea@hotmail.com

Eng Ario Senoaji
Engineer
PT PLN (Persero)
Jl.Trunojoyo Blok M I / 135 Kebayoran Baru - Jakarta 12160
Indonesia
Phone: 62-21-7261122 Ext.1320
Fax: 62-21-7227026
E-mail: asenoaji@pln.co.id

Mr Endro Supriyanto
Power Plant Expert
PT. PLN (Persero)
Jl. Trunojoyo Blok M I/135
Kebayoran Baru
- 12160
Jakarta, Indonesia
Phone: +6221 7251234 eXT. 1849
Fax: +6221 725 1048
E-mail: esupriyanto@yahoo.com

Eng Ziad Jibril Sabra
Director of Renewable Energy Department
Ministry of Energy and Mineral Resources
Jordan
Phone: +96265803060 Ext.128
Fax: 96265865714
E-mail: renewable@memr.gov.jo

Mr Malek Kabariti
President of the National Energy Research Center
Ministry of Energy and Mineral Resources
Jordan
E-mail: malek.kabariti@gmail.com;
Malek.kabariti@nerc.gov.jo

Ms Vesna Borozan
Macedonian Parliament
Macedonia
Phone: +389 70 383 919
Fax: +389 2 3064 262
E-mail: vesna.borozan@mt.net.mk

Mr Edgar Alvarado Domínguez
Asesor de Comisionado
Comisión Reguladora de Energía
Horacio #1750, 4° Piso,
Col. los Morales Polanco,
Deleg. Miguel Hidalgo, 11510, D. F.
Mexico
Phone: 52831559
Fax: 52831548
E-mail: ealvarado@cre.gob.mx

Mr José Antonio Abascal
SEDESOL
Mexico

Mr Guillermo Acosta
Comisión Federal de Electricidad
Mexico

Eng Rosa Aracely Acosta Torres
Ingeniera
CFE
Mexico
Phone: 52-29-44-00 x6828
Fax: 57-05-49-76
E-mail: aracely.acosta@cfe.gob.mx

Mr Vicente Aguilar
Conae
Mexico

Mr Ildefonso Aguilar
Grupo Diavaz
Mexico

Mr Pedro Alatorre
Ingeniero
Comisión Federal de Electricidad
Mexico
Phone: 55 9554 00 ext. 51529
Fax: 55 9554 00 ext. 51537
E-mail: pedro.alatorre@cfe.gob.mx

Dr Claudio Alatorre Frenk
Instituto de Ingenierma UNAM
Romualdo Carnero 203-3
Col. Oviedo Mota
58060 Morelia, Mich.
Mexico
Phone: 525 555 685 7030
Fax: 525 555 686 7006
E-mail: calatorre@energia.gob.mx

Edgar Alvarado Domínguez
Asesor de Comisionado
Comisión Reguladora de Energía
Horacio #1750, 4° Piso,
Col. los Morales Polanco,
Deleg. Miguel Hidalgo, 11510,
DF Mexico
E-mail: ealvarado@cre.gob.mx

Mr Eduardo David Alvarez Mireles
Coordinador de Comunicación Externa
Électricté de France México
Panzacola 64-202. Col. Villa Coyoacán. Del.
Coyoacán. C.P. 04000. México, DF
Mexico
Phone: +00 (52 55) 5339-0616
Fax: +00 (52 55) 5339-0627
E-mail: eduardo.alvarez@edfmexico.com

Mr Pablo Alvarez Watkins
Doctorado
Facultad de Ingeniería, UNAM
Universidad Nacional Autonoma de México
Facultad de Ingeniería
Av. Universidad 3000, Cd. Universitaria, CP 04510
Delegación coyoacán
Mexico DF, Mexico
Phone: (Mex) 56-22-31-20
E-mail: paw@fi-b.unam.mx

Mr Enrique Anaya
Academia Mexicana de Derecho Ambiental
Mexico

Ms Cintia Angulo Hinojosa
Directora General
EDF México S.A. de C.V.
Panzacola 62-202 Col. Villa Coyoacán
C.P. 04000
Mexico DF, Mexico
Phone: 55 53390601
Fax: 55 53390627
E-mail: cintia.angulo@edfmexico.com

Mr Vicente Aparicio Grau
Ingeniero
Iberdrola
Carretera a Dulces Nombres km.12.5 Pesquería
Nuevo León CP 66650
Mexico
Phone: (81)81534600
Fax: (81)81534605
E-mail: vicente.aparicio@iberdrola.com.mx

Mr José Carlos Arcos
IPN
Mexico

Mr Diego Arjona Arguelles
Secretario Ejecutivo
Comision Nacional para el Ahorro de Energia
Mexico DF, Mexico
Phone: (52) 55 3000-1702
Fax: (52) 55 3000-1003
E-mail: arjona@conae.gob.mx

Mr Javier Arrambide Olvera
Secretaría de Energía
Insurgentes Sur 890, Col. Del Valle, Del.
Benito Juaréz
Mexico
Phone: 5000-6000 ext. 1024
E-mail: jarrambide@energia.gob.mx

Mr Diego Agustin Arriola Jimenez
Ingeniero
Iberdrola
Mexico
Phone: +52(81)81534600 EXT 1032
Fax: +52(81)81534605
E-mail: diego.arriola@iberdrola.com.mx

Mr Eduardo Arriola Valdes
Jefe Division de Ingenieria Electrica
Facultad de Ingenieria, UNAM
Mexico DF, Mexico
Phone: 56223116
Fax: 56161855
E-mail: earriola@fi-b.unam.mx

Ing Gonzalo Arroyo Aguilera
Gerente de Programación de Sistemas Eléctricos
Comisión Federal de Electricidad
Ave. Paseo de la Reforma 164 Piso 8°
Col. Juárez C. P. 06600
México, D.F., Mexico
Phone: 52-55-57052594
E-mail: gonzalo.arroyo@cfe.gob.mx

Mr Armando Arteaga King
Gobierno del Estado de B.C.
Calzada Independencia y Heroes
Centro Civico
Mexicali, B.C., Mexico
Phone: (686) 558-1118
E-mail: aarteaga@baja.gob.mx

Ing Alfredo Elias Ayub
Director General
CFE
Mexico
E-mail: alfredo.elias@cfe.gob.mx

Mr Friederike Bachmann
Camexa Servicios
Mexico

Mr José Luis Barquet Abad
Ingeniero
INELECSA
Rutilo Torres # 737
Col Esmeralda
San Luis Potosí, S.L.P., Mexico
Phone: (444) 818 9015 y 822 4165
Fax: (444) 818 9015
E-mail: jbarquet@inelecsa.com

Mr Ramiro Barrios
Semarnat
Mexico

Mr José Alfredo Basualdo
IPN
Mexico

Mr Juan Carlos Bejarano Borboa
Subsecretario Jurídico del Estado
Gob del Edo de Baja California
Calz. Independencia #994, Centro
Cívico y Comercial, Mexicali, Baja California
Mexico
Phone: (686)5581087
Fax: (686)5581087 Ext.1460
E-mail: jbejarano@baja.gob.mx

Mr Hector Beltran
Unam
Mexico

Mr Salvador Beltrán del Río
Secretaría de Energía
Mexico

Mr Hector Beltran Mora
Instituto Ingenieria Unam
Mexico

Mr Mauricio Bermeo
Secretaria de Gobernación
Mexico

Mr Salomón Camhaji
Asergen Sc
Mexico

Mr Fernando Campos
Consultor Independiente
Mexico

HE Fernando Canales Clariond
Minister of Energy
Mexico
E-mail: fclariond@energia.gov.mx

Mr Federico Carranza Almaguer
Ingeniero
Iberdrola
Carretera a Dulces Nombres km. 12.5 Pesqueria
Nuevo León, cp 66650
Mexico
Phone: +52(81)81534600
Fax: +52(81)81534605
E-mail: federico.carranza@iberdrola.com.mx

Dip Francisco Javier Carrillo Soberon
Secretario de la Comisión de Energía
Honorable Cámara de Diputados
Av. Congreso de la Unión #66
Col. El Parque, Deleg. Venustiano Carranza
C.P. 15969
México, DF Mexico
Phone: 5628 1300 ext. 7716 y 7713
Fax: 5628 1300 ext. 7782 y 7783
E-mail: francisco.carrillo@congreso.gob.mx

Eng Luis Manuel Castro Jiménez
Ingeniero Eléctrico Electrónico
Unam
Santa María la Rivera #216, Col. San Cosme
México DF., Mexico
Phone: (55) 5773-3097
E-mail: lcastroj@hotmail.com

Ing Jose de Jesus Celis Alarcon
Phoebus Tech. Engineering Inc. S.A. de C.V.
Manuel Navarrete 41
Col. Algarin
C.P. 06880
Mexico DF, Mexico
Phone: (0052) (55) 55381085
Fax: (0052) (55) 55341339
E-mail: phoebustechinc@yahoo.com

Mr Humberto Celis Vázquez
Consultor
Secretaría de Energía
Av. Insurgentes Sur No. 890 Piso 3 Col. Del Valle
México, D.F., Mexico
Phone: 5000-6000 Ext. 1049
Fax: 5000-6223
E-mail: hcelis@energia.gob.mx

Mr Ernesto Conconi
Estado de Oaxaca
Mexico

Mr Horacio Corral
Walter Smart Environment
Mexico

Mr Fernando Cubillos
Sr. Technical Specialist
The World Bank
Mexico
Phone: 1-202-473-0961
E-mail: fcubillos@worldbank.org

Mr Belcar Cuentas-Zavala Linares
Responsable de Proyectos
Iberdrola Mexico
Manuel Avila Camacho N°28, Piso 19, Edificio Torre del Bosque, Lomas de Chapultepec, C.P. 11000
Mexico DF, Mexico
Phone: (52-55) 85034600
Fax: (52-55) 85034605
E-mail: belcar.cuentas@iberdrola.com.mx

Mr Jose Cuevas
Asesor Indpendiente
Mexico

Mr Edmundo De Alba
Instituto Nacional de Ecologia
Mexico

Dr Francisco Jose de Barnes
Comisión Reguladora de Energía
Av. Horacio No. 1750 - 4o. Piso
Col Los Morales Polanco
11510 México DF, Mexico
Phone: 5255.5283.1541
Fax: 5255.5283.1548
E-mail: fbarnes@cre.gob.mx

Mr Luis De la Cruz
Instituto Nacional para el Federalismo y el Desarrollo Municipal
Mexico

Mr Gaelo De la Fuente
Grupo Diavaz
Mexico

Mr Odón Demófilo
Maestro en Ciencias
Energía, Tecnología y Educación, S.C.
Calle Puente Xoco 39, Col. Xoco, C.P. 03330, Mexico
Phone: 55-5601-5339, 5688-2857
Fax: 55-5604-7732
E-mail: demofilo@prodigy.net.mx

Ing Carlos Dominguez Ahedo
General Director
Comision Nacional para el Ahorro de Energia
Río Lerma No. 302, Piso 5
Col. Cuauhtémoc
06598 México D. F., Mexico
Phone: (52) 55 3000-1000
Fax: (52) 55 3000-1003
E-mail: cdominguezahedo@conae.gob.mx

Mr Andre Eckermann
Mexico
Phone: 0052-55-5000 6000 ext. 1088
Fax: 0052-55-5000 6000 ext. 2160
E-mail: andre.eckermann@gtz.de

Mr Ovidio Elizondo
Direccion de Tecnologia y Desarrollo
Mexico

Mr Juan Pablo Escandón
IPN
Mexico

Ms Azucena Escobedo
Unam
Mexico

Mr Salvador Espindola Hernandez
Instituto Ingenieria UNAM
Mexico

Mr Arturo Espinoza Jaramillo
Secretario de Infraestructura y
Desarrollo Urbano del Estado
Gobierno del Estado de Baja California
Edificio del Poder Ejecutivo 4to Piso
Calzada Independencia No. 994
Centro Civico 21000
Mexicali, Mexico
Phone: 686 5581040
Fax: 686 5581965
E-mail: aespinoza@baja.gob.mx

Eng Jorge Fernandez
Ingeniero Electricista
Comisión Federal de Electricidad
Reforma 164, Piso 8
Col. Juárez
CP 06600,
México DF, Mexico
E-mail: jorge.fernandez@cfe.gob.mx

Dr Adrian Fernandez Bremauntz
Presidente
Instituto Nacional de Ecología
Periferico Sur 5000
Col. Insurgentes Cuicuilco
CP 04530, Mexico
Phone: (52) +55 -5424-6454
Fax: (52) + 55 -5424-5404
E-mail: afernand@ine.gob.mx

Mr Jorge Fernandez T
Direccion de Tecnologia y Desarrollo
Mexico
Phone: (01 55) 52 29 44 00 ext. 80083
Fax: (01 55) 52 29 45 37

Mr Gerardo Jose Ferrando Bravo
Maesto en Ciencias
Facultad de Ingeniería Unam
Av. Universidad 300, Circuito Escolar s/n
Mexico
Phone: 56162827
Fax: 56162829
E-mail: gferrando@servidor.unam.mx

Ms Claudia Flores
Profesional Independiente
Mexico

Mr Rubén Filemón Flores García
Director General
SENER
Av. Toluca 340
Col Olivar de los Padres
México DF, 01780, Mexico
Phone: 5000 61 26
E-mail: rflores@energia.gob.mx

Mr Carlos Flores Macias
Director General
Conergy Mexico
Guerrero 30, Centro
Tlalnepantla 54000,
Edo. de México, Mexico
Phone: 52-55-3640-8806
Fax: 52-55-5565-1476
E-mail: c.flores@conergy.com.mx

Mr Andres Flores Montalvo
Director de Investigacion de Programas Especiales
Instituto Nacional de Ecologia
Periferico Sur 5000
Col. Insurgentes Cuicuilco
Del. Coyoacan
CP 04530, Mexico
Phone: 52-55-5424-6467
Fax: 52-55-54246404
E-mail: aflores@ine.gob.mx

Mr Abraham Rodrigo Flores Ramos
Ingeniero Químico
Sener
Insurgentes Sur 890
Mexico
E-mail: afloresr@energia.gob.mx

Mr Luis Fernando Franco Jiménez
Petroleos Mexicanos
Mexico

Eng Euridice Fuentes Del Rio
Ing
Unam
5 de Mayo No. 14-4
Col. Sn Fco Culhuacan
Coyoacan DF
CP 04260, Mexico
Phone: 56460975
Fax: 56460975
E-mail: euri.fuentes@gmail.com

Ms Natalia García
Instituto de Investigaciones Jurídicas
Unam
Mexico

Mr Carlos García Aguilar
Superintendente General de Central
Central Eólica La Venta de la Comosión
Federal de Electricidad
Carretera Panamericana Km 821, Col. Felipe
Pescador, CP 70050
Juchitán de Zaragoza, Oaxaca, Mexico
Phone: 9717113993
Fax: 9717113993
E-mail: carlos.garcia17@cfe.gob.mx

Eng Miguel Angel García Vázquez
Vázquez
Unam
Bosques de Viena 12 #14, Fracc. Bosques del Lago,
Cuautitlán Izcalli, Estado de México., Mexico
Phone: (55) 5877-1136
E-mail: maiki27@yahoo.com

Ing Eduardo Zenteno Garza Galindo
Director General
EDF Energies Nouvelles Mexico
Av. Paseo de las Palmas 751 Of. 902
Col. Lomas Barrilaco
11010
Mexico DF, Mexico
Phone: (5255) 55202841
Fax: (5255) 55202851
E-mail: centeno@siif-energei.fr
eduardomyl@yahoo.com

Lic Carlos Garza Ibarra
Deputy Secretary for Energy Policy and Planning
Ministry of Energy
Mexico
E-mail: carlosgarza@energia.gob.mx

Mr Carlos Javier Garza Leal
Secretaría de Energía
Insurgentes Sur 890, Colonia. Del Valle, México DF,
Mexico
Phone: 5000-6000 Ext. 1051
E-mail: cjavier@energia.gob.mx

Mr Isabel Gómez Macias
Fundación Emisión
Mexico

Mr Victor Manuel Gomez Navarro
Consultores en Ingeniería Aplicada, S.C.
Articulo 7mo No. 102
Fraccionamiento constitución
C.P. 42080
Pachuca, Hgo, Mexico
E-mail: coninga@coninga.com

Mr Flavio González
Arian Solar
Mexico
Fax: (55) 5724 5812

Mr Nemorio Gonzalez Medina
Comisión Federal de Electricidad
Don Manuelito 32
Col. Olivar de los Padres
Del Alvaro Obregon
01780, DF
Mexico DF, Mexico
E-mail: nemorio.gonzalez@cfe.gob.mx

Mr Pablo Gottfried Blackmore
Gerente de Proyectos
Fuerza Eolica S.A. de C.V.
Av. Año de Juárez 205
Col. Granjas San Antonio
09069
Mexico DF, Mexico
Phone: 51 555 685 7030
Fax: 51 555 686 7006
E-mail: pgottfried@gmail.com

Ing Carlos Gottfried Joy
Director
Fuerza Eólica, S. A. DE C. V.
Av. Año de Juárez 205
Col. Granjas San Antonio
09070
Mexico DF, Mexico
Phone: 52 555 685 7030
Fax: 52 555 686 7006
E-mail: cgott@prodigy.net.mx

Mr Thomas Grube
Mexico

Mr Jorge de Jesús Guerra Gutiérrez.
Unam
Av. Tasqueña #1648. Col. Paseos de Tasqueña.
México Distrito Federal, Mexico
Phone: 56-97-66-35
E-mail:
jorgedejesusguerragutierrez@yahoo.com.mx

Mr Gerardo Guerrero
Unam
Mexico

Mr Tomás Enrique Guijarro Rojas
Director de Desarrollo de Negocios Latinoamérica
Iberdrola
Boulevard Manuel Avila Camacho 24, Piso 19
Edif Torre del Bosque, Col Lomas de Chapultepec
CP 11000, México DF, Mexico
Phone: (5255) 85 03 46 04
Fax: (52 55) 85 03 46 05
E-mail: tomas.guijarro@iberdrola.com.mx

Mr Ruben Guizar Bejarano
Asesor
SENER-USAID
Insurgentes Sur 890 Piso 12, Col. Del Valle.
México, D.F. CP 03100, Mexico
Phone: 5000-6000 Ext. 1076
Fax: 5000-6223
E-mail: rguizar@energia.gob.mx

Mr Joaquin Gutierrez Ley
Ingeniero
Gobierno del Estado de Baja California
Calzada Independencia # 994
Sidue Cuarto Piso
Edificio del Poder Ejecutivo
Centro Civico
Mexicali Baja California, Mexico
Phone: (686)-558-19-08
Fax: (686)-558-11-40
E-mail: jgutierrez@baja.gob.mx

Enrique Guzmán Lara
Ingeniero
Comisión Reguladora de Energía
Horacio 1750, col. los Morales, C.P. 11510
Mexico
Phone: 01.55.52.83.15.21
Fax: 01.55.52.83.15.01
E-mail: eguzman@cre.gob.mx

Mr Sebastian Hack
Gtz
Mexico
E-mail: sebastian.hack@gmx.net

Ms Claudia Luz Hernández Esteva
Secretaría de Energía
Insurgentes sur #890 Piso 12
Col. del Valle
03100 México, D.F., Mexico
Phone: 55.5000.6000 x 1018
Fax:
E-mail: clhernandez@energia.gob.mx

Mr Marco A Hernández Monroy
Director General
SCHOTT Mexicana S. A.
Chicle 162,
08400 Iztacalco,
Mexico DF, Mexico
Phone: +52 55 5803 1210
Fax: +52 55 5649 9801
E-mail: mhdezm@prodigy.net.mx

Mr Cruz Ernesto Hernandez Ramirez
Coordinador
Petróleos Mexicanos
Av. Marina Nacional # 329 Piso 35 TE
Col. Huasteca
México D.F. C.P. 11311
Mexico DF, Mexico
Phone: 52 55 1944 2500 ext. 54759
Fax: 52 55 1944 8669
E-mail: cehernandez@dco.pemex.com

Mr Giovanni Octavio Hernandez Uribe
UNAM
Calle 51 # 27, Col. Santa Cruz Meyehualco
Mexico
Phone: 56913286
E-mail: exergiovanni@gmail.com

Eng Juan Herrera Romero
Ingeniero
Energía Posgrado UNAM
Av. San Francisco Culhuacan #139
Colonia Ejidos San Francisco Culhuacan
C.P. 04420
Coyoacan, Distrito Federal, Mexico
Phone: 5656 7959, 55 2955 5145
Fax: 5656 7959
E-mail: juanhero@gmail.com

Dr Jorge Huacuz Villamar
Gerente de Energías no Convencionales
Instituto de Investigaciones Eléctricas
Av. Reforma 113
Col. Palmira
11590 Mexico DF, Mexico
Phone: 52 555 685 7030
Fax: 52 555 686 7006
E-mail: jhuacuz@iie.org.mx

Lic Antonio Huerta Goldman
Director General de la Unidad de Promoción de Inversiones
Secretaría de Energía
Insurgentes sur #890 Piso 12
Col. del Valle
03100
Mexico DF, Mexico
Phone: 55.5000.6000 x 1018
E-mail: ahuerta@energia.gob.mx

Mr Federico Hungler Salceda
Director de Cogeneracion y Energia Renovable
Comision Nacional para el Ahorro de Energia
Rio Lerma 302 COL. Cuauhtemoc, C.P. 06500,
Mexico DF, Mexico
Phone: (52) 55 3000-1000 Ext. 1218
Fax: (52) 55 3000-1003
E-mail: cog@conae.gob.mx

Mr Ubaldo Inclan
Secretaría de Energía
Mexico

Mr Javier Labastida Alvarado
Ing. Eléctico Electrónico
Facultad de Ingeniería Unam
Artes No. 14 Coyoacán.
México DF, Mexico
Phone: 56-59-44-53
E-mail: jlabastidaa@yahoo.com.mx

Mr Israel Laguna Monroy
Subdirector de Metodos y Estudios de Mitigacion del Cambio Climatico
Instituto Nacional de Ecologia
Periferico Sur 5000
COL. Insurgentes Cuicuilco
CP 04530 , Mexico
Phone: (52) + 55 + 5424-6467
Fax: (52) + 55 +5424-6404
E-mail: ilaguna@ine.gob.mx

Mr Jorge A Landa Bonilla
Energy and Clean Production Advisor
U.S. Agency for International Development
Paseo de la Reforma No. 305
Col. Cuauhtemoc
06500 Mexico DF, Mexico
Phone: (52-55) 5080-2951
Fax: (52-55) 5080-2494
E-mail: jlanda@usaid.gov

Salvador Landeros Ayala
Doctor en Ingeniería
Facultad de Ingeniería, UNAM
Av. Universidad No. 3000
Col. Copilco Universidad
Delg. Coyoacán
CP. 04510 , Mexico
Phone: (52) 5556223004 al 06
Fax: (52) 5556161073
E-mail: sland@fi-b.unam.mx

Mr Mario Lara
Ingeniero
Comisión Federal de Electricidad
Don Manuelito No. 32
Col. Olivar de los Padres
C.P. 01780
Deleg. Alvaro Obregón
Mexico
Phone: 01 (55) 55955400 Ext. 51501
Fax: 01 (55) 55955400 Ext. 51510
E-mail: mario.lara@cfe.gob.mx

Lic Eugenio Laris Alanís
Director for Financed Generation Projects
Comisión Federal de Electricidad
Paseo de la Reforma No. 164, Piso 11
Col. Juárez
06600
Mexico DF, Mexico
E-mail: eugenio.laris@cfe.gob.mx

Mr Javier Lascurain
Mexico

Ms Gladis Elisabeth Leal Garza
Licenciada
Secretaría de Energía
Insurgentes sur, 890, Tercer Piso. Col. del Valle
Mexico DF, Mexico
Phone: 50 00 60 58
E-mail: gleal@energia.gob.mx

Mr Martha Lezcano
Comisión Federal de Electricidad
Mexico

Mr Eduardo Lobaton Gonzalez
Jefe Unidad Proyectos Especiales.Subdireccion de Distribucion
Luz y Fuerza del Centro
Melchor Ocampo 171
Col. Tlaxpana
11379 Mexico DF, Mexico
Phone: 51 40 04 80
Fax: 51 40 02 93
E-mail: elobaton@inter01.lfc.gob.mx

Ms Fabiola López
SHCP
Mexico

Mr Serafín López
Comisión Federal de Electricidad
Mexico

Mr Federico Lopez de Alba
Comision Federal de Electricidad
Mexico
Phone: 052-55-5229-4400- Ext. 44038

Mr Edgar López Satow
Comisión Reguladora de Energía
Mexico

Ms Solange Marquez
Fundación para la paz en la Era Núclear
Mexico

Mr Felix B Marquez
Ingeniero
Comisión Federal de Electricidad
Don Manuelito No. 32
Col. Olivar de los Padres
C.P. 01780
Deleg. Alvaro Obregón
Mexico
Phone: 55 9554 00 Ext. 51511
Fax: 55 9554 00 Ext. 51510
E-mail: felix.marquez@cfe.gob.mx

Mr Mauricio Marroquin Brittingham
Ingeniero
Iberdrola
Carretera a Dulces Nombres km 12.5 Pesqueria
Nuevo Leon, CP 66650, Mexico
Phone: +52(81)81534600
Fax: +52(81)81534605
E-mail: mauricio.marroquin@iberdrola.com.mx

Dr Cecilia Martin Del Campo
Facultad de Ingeneiría UNAM
Av. Paseo Cuauhnáhuac 8532
Col. Progreso
62550, Jiutepec, Morelos., Mexico
Phone: (777) 3 19 32 82
Fax: (777) 3 19 41 01
E-mail: cmcm@fi-b.unam.mx

Dr Manuel Martínez
Investigador
Programa de Energía. Universidad Autónoma de la Ciudad de México
Colonia del Valle
San Lorenzo 290
Mexico DF, Mexico
Phone: 52-55-54886661 Ext. 5304
Fax: 55755805
E-mail: mmartinez@energiauacm.org.mx

Ms Julia Martinez Fernandez
Coordinador del Programa de Cambio Climatico
Instituto Nacional de Ecologia
Periferico Sur 5000
Col. Insurgentes Cuicuilco
Del. Coyoacan
CP 04530, Mexico
Phone: 52-55-5424-6424
Fax: 52-55-5424-6424
E-mail: jmartine@ine.gob.mx

Eng Angelberto Martinez Gomez
Ingeniero Mécanico
Comisión de Energía Cámara de Diputados
Av. Congreso de la Unión #66, Col. El Parque.
C.P. 155969, Delegación Venustiano Carranza.
Mexico DF, Mexico
Phone: 56 28 13 00 Ext. 7716 7713
Fax: 56 28 13 00 Ext. 7783, 7782
E-mail: angelberto@infosel.net.mx

Mr Rodolfo Martinez Strevel
Ovonic Energy International
Lic. Grajales Robles 16, Despacho # 7
Col. Del Valle
Mexico, DF 03100, Mexico
Phone: 52 55 11 07 61 50
Fax: 52-55 11 07 77 53
E-mail: strevel@avantel.net

Dr Juan Mata
Director General for Environment, Technology, Development, and Research
Ministry of Energy
Mexico
Phone:
Fax:
E-mail: jmata@energia.gob.mx

Mr Santiago Martin Mata Chavez
Ingeniero
Energia, Tecnologia y Educacion S.C.
Calle Puente Xoco No. 39
Col. Xoco
Deleg. Benito Juarez
03330
Mexico DF, Mexico
Phone: 52 55 56 88 28 57
Fax: 52 55 56 04 77 32
E-mail: smmatac@prodigy.net.mx

Mr Pedro Matabuena
Facultad de Ing. UNAM
Mexico

Mr Arturo Mateos
Despacho de Arquitectura
Mexico

Mr Yasuhiro Matsumoto
IPN
Mexico

Mr Alfonso Mendoza
Price Water House Converse
Mexico

Mr Juan Jose Mendoza Salgado
Comision Federal de Electricidad
Mexico

Mr Eduardo Meraz Ateca
Comisión Federal de Electricidad
Don Manuelito 32
Col. Olivar de los Padres
01780, Alvaro Obregón
Mexico
Fax: (55) 5595 5400 Ext. 51033
E-mail: eduardo.meraz@cfe.gob.mx

Mr José Luis Millán
Arian Corportativo
Mexico

Mr Carlos Mira Álvarez
Mira Industrial
Mexico

Mr Carlos Montaño
Director General Planeación Energética
SENER
Insurgentes Sur 890 Piso 3
Del Valle
Mexico DF, Mexico
Phone: 5000 6022
E-mail: cmontano@energia.gob.mx

Mr Rene Martin Montijo Villegas
Gobierno del Estado de B.C.
Calzada Independencia y Heroes
Centro Civico
Mexicali, B.C., Mexico
Phone: (686)558-1071
E-mail: rmontijo@baja.gob.mx

Mr José Enrique Morales Sahagún
Director General México
Endesa Cogeneración y Renovables
Av. Insurgentes sur 1457 p. 13 , Col. Insurgentes
Mixcoac. C.P. 03920 , México DF, Mexico
Phone: 01 55 5611 39 39
Fax: 01 55 56 1162 77
E-mail: emorales@endesa.com.mx

Luis Arturo Moreno Vega
Energy and Climate Change Campaigner
Greenpeace Mexico
Vertiz 646
Col. Narvarte
03010
Mexico DF, Mexico
Phone: 5530-2165
Fax: 5530-8969
E-mail: arturo.moreno@mx.greenpeace.org

Dr David Morillón Gálvez
Presidente
Asociación Nacional de Energía Solar
Edificio 12, Instituto de Ingeniería, UNAM, CU, CP. 04510
Mexico DF, Mexico
Phone: 5622 5200
Fax: 5622 5221
E-mail: dmorillon@sid.unam.mx;
anescomite@anes.org

Mr John Paul Moscarella
Executive Vice-President and Manager
Econergy International/Clean Tech Fund
Monterrey, Mexico
Phone: 52-81-8363-1176
Fax: 52-81-8363-1176
E-mail: moscarella@econergy.com

Mr Rafael Narvaez Avila
Ingeniero Eléctricista
Comisión Federal de Eléctricidad
Reforma No. 164-8 Piso
Col. Juárez
C.P. 06600 México DF
Mexico
Phone: (01-55) 52-29-44-00 Ext. 80079 80076
Fax: (01-55)52-29-45-37
E-mail: rafael.narvae@cfe.gob.mx

Gustavo Daniel Núñez Güereña
Ingeniero Industrial
Sunpower S.A. de C.V.
Cerrada Río Becerra # 112
Col. 8 de Agosto
C.P. 03820
Mexico DF, Mexico
Phone: 52-76-21-51, 30-04-34-72
Fax: 52-76-33-79
E-mail: gustavo@sunpower.com.mx

Josue Elias Obregon Lozano
Jefe de Energeticos
Sanluis Rassini
Monte Pelvoux No. 220 P-8
Col. Lomas de Chapultepec
11000
Mexico DF, Mexico
Phone: 5255 52295829
Fax: 5255 55209797
E-mail: irivero@sanluisrassini.com

Mr Gerardo Oceguera Peña
Universidad Ciudad de México
Mexico
Phone: 55 31 14 27 55

Eng Julian Orozco Servín
Ingeniero
Comisión Federal de Electricidad
Subdirección de Generación
Calle Don Manuelito #11. Colonia Olivar de Los
Padres. Delegación Álvaro Obregón. CP. 01780
Mexico
Phone: 54 90 40 00 Ext. 72710
Fax: 54 90 40 00 Ext. 72784
E-mail: julian.orozco@cfe.gob.mx

Mr José Ortega Cruz
Ingenierio Electromecanico
Cie-Unam
Priv. Xochicalco s/n.
Col. Centro.
Temixco, Morelos.
C.P. 62580.
Mexico
Phone: 17773250052
Fax: 17773250018
E-mail: joc@cie.unam.mx

Mr Hermilio Oscar Ortega Navarro
Ingeniero en Energía
IPSE S.A. de C.V.
Barranquilla 22, El Ahuehuete
C.P. 56190
Texcoco, Estado de México
Mexico
Phone: 01(595) 923-4256
E-mail: hermilio.ortega@gmail.com

Ms María Ortiz
Subdirección de Permisos Eléctricos
Comisión Reguladora de Energía
Horacio 1750, Polanco 11510
Mexico DF, Mexico
Phone: 5.2555283152e+011
Fax: 5.255528315e+011
E-mail: mortiz@cre.gob.mx

Mr Javier Padilla Molina
Gerente
Cableados Industriales, S.A. de C.V.
Jaime Balmes No. 11, Edif D, Local 130-E,
Col. Los Morales Polanco. 11510
Mexico DF, Mexico
Phone: (52-55) 5395-6083
Fax: (52-55) 5395-5819
E-mail: jpadilla@cisae.com.mx

Mr Sergio Palafox Palafox
Ingeniero
Comisión Federal de Electricidad
Paseo de la Reforma No. 164 Piso 14
Col. Juárez
Mexico DF, C.P. 06600
Mexico
Phone: 55 5229-4400 Ext. 6962
Fax: 55 5705-4419
E-mail: sergio.palafox@cfe.gob.mx

Ms Patricia Rocio Parra Espindola
Estocolmo #8 Col Jardines de Bellavista Tlalnepantla,
Edo de Mex. CP 54054
Mexico
E-mail: patricia.parra@owenscorning.com

Ms Raquel Pedraza
SHCP
Mexico

Mr Alejandro Peraza
Comisión Reguladora de Energía
Mexico

Lic Gerardo Perdomo Sanciprian
Director General de Información y Estudios
Energéticos
Secretaría de Energía
Insurgentes Sur 890, Piso 3, Colonia Del Valle, C.P.
03100, México DF
Mexico
Phone: (55) 50006014
Fax: (55) 50006223
E-mail: gperdomo@energia.gob.mx

Ms Gabriela Pereda Dominguez
Commercial Officer, Energy Sector
British Embassy, Mexico City
Rio Lerma #71
Col. Cuauhtemoc
CP. 06500
Mexico DF, Mexico
Phone: 52428538
Fax: 52428522
E-mail: gabriela.pereda@fco.gov.uk

Mr Nahum Pérez
Unam
Mexico

Mr Antonio Pérez
Secretaría de la Función Pública
Mexico

Mr Gonzálo Pérez
Iberdrola
Mexico

Ms Katya Pérez Guzmán
Programa Aire y Energía
Centro Mexicano de Derecho Ambiental, A.C.
Atlixco # 138
Col. Condesa
Del. Cuauhtémoc
Mexico
Phone: -8554
Fax: -7749
E-mail: katyap@cemda.org.mx

Dr Rogelio Ramirez Barradas
Comisión Federal de Electricidad
Reforma 164 Piso 9
Delegación Cuauhtemoc
C.P. 06600
Mexico DF, Mexico
Phone: 57052594
E-mail: rogelio.ramirez@cfe.gob.mx

Mr Gaudencio Francisco Ramos Niembro
Coordinador Tecnico
Comision Nacional para el Ahorro de Energia
Rio Lerma 302 COL. Cuauhtemoc, C.P. 06500
Mexico DF, Mexico
Phone: (52) 55 3000-1079
Fax: (52) 55 3000-1003
E-mail: gframos@conae.gob.mx

Mr Enrique Rebolledo
Semarnat
Revolución 1425
Col. Tlacopac - San Angel
DF, 01040
Mexico
Phone: 52-55-56243614
E-mail: enrique.rebolledo@semarnat.gob.mx

Mr Arturo Guillermo Reinking Cejudo
Jefe Depto. Sistemas Energéticos, Faculta de
Ingeniería
Unam
Edificio Bernardo Quitana. 1er Piso
Circuito Exterior
Ciudad Universitaria
Unam
05170, Mexico
E-mail: reinking@servidor.unam.mx

Mr Franklin David Rendón Fricks
Ingeniero Industrial
Olmecapan, S. C.
Priv. de Apolinar Castillo No. 19
Fraccionamiento Los Ángeles
Xalapa, Veracruz
C.P. 91060, Mexico
Phone: (228) 818 3244
Fax: (228) 818 3244
E-mail: chompokank@xal.megared.net.mx

Dr Franklin Rendón González
PhD en Ingeniería
Olmecapan, S. C.
Priv. de Apolinar Castillo No. 19
Fraccionamiento Los Ángeles
Xalapa, Veracruz
C.P. 91060, Mexico
Phone: (228) 818 3244
Fax: (228) 818 3244
E-mail: olmecapan@xal.megared.net.mx

Ms Elsa Gabriela Renteria Martinez
Asistente Proyecto de Energia Solar
Procobre Mexico
Bosques de Alisos 47-B
Interior A1-02 Oficina 25
Bosques de las Lomas ,Cuajimalpa
05120
Mexico
Phone: 51483223
Fax: (525) 5148-3224
E-mail: erenteria@copper.org

Dr Eduardo Rincón Mejía
Doctor
Asociación Nacional de Energía Solar
Edificio 12, Instituto de Ingeniería, UNAM, CU
CP. 04510, México, DF
Mexico
Phone: 5622 5200
Fax: 5622 5221
E-mail: rinconsolar@hotmail.com

Mr Rolando Rodriguez
Maestro
Conae
Rio Lerma 302, Col. Cuauhtemoc, Del. Col.
Cuauhtemoc
Mexico
Phone: 30001007
E-mail: cp@conae.gob.mx

Ms Rosamaria Rodriguez
Mexico

Mr Nicolás Rodríguez Martínez
Ingeniero
Instituto Mexicano del Petróleo
Eje Central Lázaro Cárdenas No. 152
Edif. Principal Piso 4
Col. San Bartolo Atepehuacan
07730, Gustavo A. Madero, México DF,
Mexico
Phone: 52 (55) 9175-6139
Fax: 52 (55) 9175-6144
E-mail: nrmartin@imp.mx

Mr Leopoldo Alberto Rodriguez Olive
Servicios Industriales Penoles SA CV
Moliere 222 3er Piso
Col. Los Morales, Secc. Palmas
11540
Mexico DF, Mexico
E-mail: leopoldo_rodriguez@penoles.com.mx

Ms Lorena Roman
Firco
Mexico

Mr David Romero
Unam
Mexico

Mr Arturo Romero
Mexico

Mr Jose Luis Roque Gayoso
Sedesol México
Mexico

Eng Sergio Rosas de Alva
Ingeniero
Comisión Federal de Electricidad. Subdirección de
Generación
Calle Don Manuelito #11. Colonia Olivar de los
Padres C.P. 01780. delegación Álvaro Obregón.
Mexico DF, Mexico
Phone: 54 90 40 00 Ext. 72 800 72801
Fax: 54 90 40 00 Ext. 72784
E-mail: sergio.rosas01@cfe.gob.mx

Mr Julio Cesar Rosas Porcayo
Ing. Electromecánico
CIE- UNAM
Privada Xochicalco S/N
Col. Centro
Temixco, Morelos
62580, México
Phone: (777) 325-0052
Fax: (777) 325-0018
E-mail: jcop@cie.unam.mx

Ms Belizza Janet Ruiz Mendoza
Estudiante
UNAM
Calle Ayotosco, Lote 10, Manzana 16, Col. Santo Domingo, Del. Coyoacán, C.P. 04369
Mexico
E-mail: bjrmco@yahoo.com

Rodolfo Javier Salcedo Novella
Licenciado
CySTE
Magdalena 201
Col. Del Valle
Delegación Benito Juárez
03100 México DF, Mexico
Phone: 5148 9387
Fax: 5148 9385
E-mail: rodolfosalcedo@aol.com

Mr Jaime Saldaña
Sistemas de Energia Internacional
Mexico

Eng Gustavo Salvador Torres
Subdirector del Centro Nacional de Control de Energía
Comisión Federal de Electricidad
Don Manuelito 32
Olivar de los Padres
01780, Alvaro Obregon
Mexico DF, Mexico
E-mail: gustavo.salvador@cfe.gob.mx

Mr Anselmo Sanchez
Ingeniero
Comisión Federal de Electricidad
Don Manuelito No. 32
Col. Olivar de los Padres
C.P. 01780
Deleg. Miguel Hidalgo
Mexico
Phone: 55 9554 00 Ext. 51542
Fax: 55 9554 00 Ext. 51537
E-mail: anselmo.sanchez@cfe.gob.mx

Mr Carlos Sánchez
Comisión Federal de Electricidad
Mexico

Mr José Ramón Sánchez Ceresuela
Ingeniero Químico
Cryplant
Adolfo Ruiz Cortines 102-C, Col. Acapantzingo,Cuernavaca, Morelos, México CP 62440
Phone: 52-777-3125048 and 3141392
Fax: 52-777-3106158
E-mail: cryplant@prodigy.net.mx

Dr Aarón Sánchez Juárez
Centro de Investigación en Energía
Priv de Xochicalco s/n Col Centro
Temixco, Morelos
Mexico
Phone: +52-55- 5632 9716
Fax: +52-777- 325 2469
E-mail: asj@cie.unam.mx

Klara Schrittenlocher
Interpreter German Federal Ministry for the Environment
Fuente del Salvador 24, Tecamachalco, 53950, Edo. Mex.
Mexico
E-mail: klara1102@yahoo.de

Ms Yenny Sumano
Equipamientos y Suministros Industriales
Mexico

Dr Jesús Alberto Tejeda Ricardez
Doctor Ing. Químico
IIE/PNUD Proyecto Eólico
Av. Reforma No. 113, Col. Palmira
CP 62490 Cuernavaca, Morelos México
Phone: (777) 3 62 38 11
Fax: (777) 3 62 38 08
E-mail: jtejeda@iie.org.mx

Mr Luis Torregrosa
Unam
Mexico

Mr Ramon Carlos Torres Enriquez
Sener
Mexico
Phone: 5000 6000 Ext. 1382

Rubén Torres Gutiérrez
Ingeniero en Energía
CySTE
Magdalena 201
Col. Del Valle
Del. Benito Juárez
03800 México DF, Mexico
Phone: (55) 5148 9387
Fax: (55) 5148 9385
E-mail: ruben.torres@cyste.com.mx

Mr Miguel Angel Valdovinos Terán
Físico
Comisión Federal de Electricidad
Paseo de la Reforma No. 164 Piso 14
Col. Juárez
México DF, C.P. 06600, Mexico
Phone: 55 5705-2195
Fax: 55 5705-4976
E-mail: miguel.valdovinos@cfe.gob.mx

Mr Julio Alberto Valle Pereña
Secretaría de Energía
Insurgentes sur #890 Piso 12
Col. del Valle
03100
Mexico DF, Mexico
Phone: 55.5000.6000 x 1018
E-mail: jvalle@energia.gob.mx

Mr Roberto Gabriel Vera Azar
Director Jurídico de Normatividad Administrativa
Gob del Edo de Baja California
Calz Independencia #994, Centro Cívico y
Comercial, Mexicali, Baja California, Mexico
Phone: (686)5581087
Fax: (686)5581087 Ext. 1460
E-mail: rvera@baja.com.mx

Eng Yolanda Zeferino Abundis
Ing. Eléctrico-Electrónico
Amee
Rosas de Mayo #11
Col. Benito Juárez, Cd. Nezahualcoyotl
Edo. de México, Mexico
Phone: 51111861
E-mail: yolanda_za@yahoo.com.mx

Mr Eduardo Zenteno
Eléctrica del Valle de México
Mexico

Ing Jacobo Mekler Waisburd
Ingeniero
Comexhidro
Bosque de Ciruelos 190-303A
Bosques de las Lomas
C.P. 11700
Mexico DF, Mexico
Phone: 5.2555596892e+011
Fax: 5.2555251607e+011
E-mail: jmekler@asergen.com.mx

Dr Gerrit-Jan Schaeffer
Dr Ir
ECN
PO Box 1, 1755 ZG
Petten, Netherlands
Phone: 31 224 56 8264
Fax: 31 224 56 8966
E-mail: schaeffer@ecn.nl

Mr Ulrich Schoppmeyer
Director
Agencia del KfW para América Central y México
Centro Ejecutivo San Marino
Módulo B-403, 2do. Piso
Managua, Nicaragua
Phone: (505) 2550535/36
Fax: (505) 2550537
E-mail: uschoppmeyer@enitel.net.ni

Mr Ewah Eleri
Executive Director,
International Center for Energy, Environment, and
Development
Chatti Plaza, 6 Sapele Street, Garki II
Abuja, Nigeria
Phone: +234 9 234 8525
Fax: +234 9 234 8525
E-mail: ewaheleri@yahoo.com

Prof Onwuamaeze Casmir Iloeje
Chairman
Nigerian Electricity Regulatory Commission
26, Mediterranean Street
(Off Shehu Shagari Way)
Cadastral Zone A6
Maitama
Abuja, Nigeria
Phone: +234-9-413 1611; 0804-4127127(GSM)
Fax: +234-9-413 0783
E-mail: ociloeje2000@yahoo.com

Mr Farkhand Iqbal
Joint Secretary
Planning Commission
Joint Secretary
Energy Wing
Planning and Development Vision
99-West
Shalimar Plaza
Blue Area
Islamabad, Pakistan
Phone: 0092-51-2255563
Fax: 0092-51-2264159
E-mail: farkhandiqbal@hotmail.com

Mr Ulrich Stohr-Grabowski
Principal Advisor
German Technical Advisor
House No 63-A, Street No 5, F-8/3
Islamabad, Pakistan
Phone: 0092-51-2255563
Fax: 0092-51-2264159
E-mail: ulrich.stoehr-grabowski@gtz.de

Mr Pedro Glicerio Villa Durand
Ingeniero Electricista
World Bank/Gobierno Perú MEM-Proyecto FONER
Av. Las Artes 260 - San Borja
41
Lima, Peru
Phone: 475 0535 - 9945 7988
E-mail: pvilla@minem.gob.pe

Mr Maciej Nowicki
President
EcoFund Foundation
Bracka 4, 00 502
Warsaw, Poland
Phone: +48 22 628 50 85
Fax: +48 22 628 50 81
E-mail: mnowicki@ekofundusz.org.pl
E-mail: jgrabowska@ekofundusz.org.pl

Mr Valdimir Maksimov
Adviser
Ministry of Economic Development and Trade of Russian Federation
1st Tverskayao Yamskaya,1,3 125993
Moscow, Russia
Phone: +7 (495) 209-8080
Fax: +7 (495) 209-5333
E-mail: MaximovVA@economy.gov.ru

Mr Mathieu-Credo Koumoin
UNDP-GEF Regional Coordinator, Energy and Climate Change
UNDP-GEF
5, Boulevard de l'Est, Point E. B.P. 154 Dakar, Senegal
Senegal
Phone: (221)-869-0638
Fax: (221)-869-0681
E-mail: mathieu.koumoin@undp.org

Mr Andre Otto
Deputy Director
Department of Minerals and Energy
Private Bag x 59
Pretoria
South Africa
E-mail: andre.otto@dme.gov.za

Mr Naresh Singh
General Manager and Acting CEO
National Energy Regulator
PO Box 40343
Arcadia
0007
Pretoria, South Africa
Phone: +27 12 401 4600
Fax: +27 12 401 4680
E-mail: naresh.singh@ner.org.za

Lic José Gil López
Licenciado en Ciencias Económicas y Empresariales
Instituto para la Diversificación y Ahorro de la Energía (IDAE)
Madera, 8
28004
Madrid, Spain
Phone: +34 91 4565023
Fax: +34 91 5230414
E-mail: josegil@idae.es

Mr Melchor Ruiz Perez
Acciona Energia
Avda. de Europa, 10
Parque Empresarial La Moraleja
28108 Alcobendas (Madrid)
Spain
Phone: 34 91 663 06 72
Fax: 34 91 663 07 59
E-mail: shurtado@ehn.es

HE MMC Ferdinando
Secretary
Ministry of Power & Energy, Sri Lanka
Ministry of Power & Energy
No 493/1

T.B.Jayah Mawatha 10
Colombo, Sri Lanka
Phone: 94112665259
Fax: 94112687360
E-mail: secrepe@sltnet.lk

HE Ridha Ben Mosbah
Secretary of State
Ministry of Industry, Energy and Small and Middle Enterprises
Rue 8011 - Immeuble Ennozha Montplaisir 1073
Tunis, Tunisia
Phone: 216 71 841 503
Fax: 216 71 799 728
E-mail: ridha.benmosbah@wanadoo.tn

Mr Ezzeddine Khalfallah
Directeur Général de l'Agence Nationale pour la Maîtrise de l'Energie
National Agency for Energy Conservation "ANME"
3, Rue 8000 Montplaisir 1073
B.P. 213
Tunis, Tunisia
Phone: 216 71 782 419
Fax: 216 71 782 622
E-mail: dg@anme.nat.tn

Eng Emmanuel Jjunju
Projects Engineer
Electricity Regulatory Authority
15. Shimoni Road
PO Box 10332
Kampala, Uganda
Phone: 256-41341646
Fax: 256-41341624
E-mail: e.jjunju@era.or.ug

Mr FJ Kasujja
Board Member
Electricity Regulatory Authority (ERA)
15 Shimoni Road
Po Box 10332
Kampala, Uganda
Phone: 256-41341646
Fax: 256-41341624
E-mail: era@africaonline.co.ug

Dr Shimon Awerbuch
Senior Fellow Science and Technology Research
SPRU Energy Group, University of Sussex
Freeman Centre
Brighton, BN1 9QE
United Kingdom
E-mail: awerbuch@alum.rpi.edu

Mr Peter Meier
Chief Economist
Zurich Economics
Glasgow, United Kingdom
E-mail: qmeier@aol.com

Ms Catherine Mitchell
Senior Principal Research Fellow
Centre for Management Under Regulation, Warwick Business School
University of Warwick
Coventry CV4 7AL
United Kingdom
Phone: (44) 2476 524985
Fax: (44) 2476 524965
E-mail: catherine.mitchell@wbs.ac.uk

Mr Dan Adler
Director, Technology and Policy Development
California Clean Energy Fund
582 Market Street, Suite 1015
94104
San Francisco, CA, USA
Phone: 415 986 4590
Fax: 415 986 4591
E-mail: dan.adler@calcef.org

Mr Romulo Bisetti
Latin America Sales Manager
Kyocera Solar, INC
7812 E Acoma DR
Scottsdale, AZ 85260
USA
Phone: 480 443 7724
Fax: 480 368 5812
E-mail: romulo@kyocerasolar.com

Mr Ravindra Anil Cabraal
Lead Energy Specialist
The World Bank
1818 H Street NW, H 3-443
Washington, DC, USA
Phone: 202-458-1538
Fax: 202-522-3228
E-mail: acabraal@worldbank.org

Mr Juan Cruz Monticelli
Consultor
Organización de los Estados Americanos
1889 F St. NW
Washington, DC 20006
Suite 691
USA
Phone: +(202) 458-3745
Fax: +(202) 458-3560
E-mail: usdecpr9@oas.org

Mr Homero Del Bosque
Vice-President, Latin America
Energy Conversion Devices
9855 Crosspoint Blvd. Ste 142
Indianapolis, IN, USA
Phone: 317-577-1330
Fax: 317-849-8773
E-mail: sandru_pk@yahoo.com

Ms Larisa E Dobriansky
Deputy Assistant Secretary for National Energy
Office of Policy & International Affairs
1000 Independence Avenue, S.W.
Washington, DC. 20585
USA
Phone: (202) 586-1524
Fax: (202) 586-3047
E-mail: larisa.dorbriansky@hq.doe.gov

Mr Eduardo Dopazo
The World Bank
USA
E-mail: edopazo@worldbank.org

Ms Gabriela Elizondo Azuela
Senior Energy Specialist
The World Bank
1818 H Street
Washington, DC, USA
Phone: (202) 456 5392
Fax: (202) 676 1821
E-mail: gazuela@worldbank.org

Mr Daniel Farchy
JPA Latin America Energy Cluster
The World Bank
USA
MSN I5-502
1818 H St. NW
Washington, DC, 20433
Phone: +1 202 413 1032
E-mail: dfarchy@worldbank.org

Mr Charles Feinstein
Sector Leader for Finance, Private Sector and
Infrastructure, LAC
The World Bank
USA
E-mail: cfeinstein@worldbank.org

Mr Chris Flavin
President
Worldwatch Institute
USA
E-mail: cflavin@worldwatch.org

Ms Eileen Margaret Frederiksen
Knowledge Coordinator
The World Bank
MSN H 3-307
1818 H. Street NW
Washington, DC, USA
Phone: 202-473-2710
Fax: 202-522-3228
E-mail: efredriksen@worldbank.org

Mr Edward Ted Gilman Kennedy
Renewable Energy/Climate Change Specialist
The World Bank
1818 H. Street NW
Washington, DC, USA
Phone: 202-473-0219
E-mail: tkennedy@worldbank.org

Ms Susan Goldmark
Energy Sector Manager, LAC
The World Bank
USA
E-mail: sgoldmark@worldbank.org

Mr Leonard Good
Chief Executive Officer and Chairman
Global Environment Facility
1818 H Street NW
MSN G-6-602
Washington, DC, USA
Phone: 202-473-3202
Fax: 202-522-3240
E-mail: lgood@thegef.org

Ms Janice G Hamrin
Executive Director
Center for Resource Solutions
USA
E-mail: jhamrin@resource-solutions.org

Mr Richard Hosier
Team Leader, Climate and Chemicals
Global Environment Facility
1818 H St NW
Room G-6055
Washington, DC, USA
Phone: (202)458-0290
Fax: (202)522-3240
E-mail: rhosier@thegef.org

Mr Peter Johansen
The World Bank
USA
E-mail: pjohansen@worldbank.org

Mr Todd Milo Johnson
Senior Energy Specialist
The World Bank
1818 H Street
Washington, DC, USA
Phone: 01-202-458-2435
E-mail: tjohnson@worldbank.org

Mr Morgan Landy
Manager of Renewable Energy and Public Private Partnerships
IFC Infrastructure Department
USA
E-mail: mlandy@ifc.org

Ms Debora Ley
1112 Sagebrush Tr. SE
Albuquerque, NM, USA
Phone: 001-505-332-0432
E-mail: debbieannley@yahoo.com

Mr Lew Milford
President
Clean Energy Group
USA
E-mail: lmilford@cleanegroup.org

Mr Gustavo Perez
Sr. Community Development Specialist
City of Chula Vista
276 Fourth Avenue
Chula Vista, CA 91910
USA
E-mail: gperez@ci.chula-vista.ca.us

Ms María Hilda Rivera-Ramirez
Energy Engineer
Energy and Security Group
Washington, DC, USA
Phone: 703-689-4670 x115
Fax: 703-689-4427
E-mail: maria@energyandsecurity.com

Ms Jodie Roussell
Associate Director
American Council on Renewable Energy (ACORE)
PO Box 33518
Washington, DC 20006
USA
Phone: +1.202.393.0001 x 7584
Fax: +1.202.393.0606
E-mail: roussell@acore.org

Mr Jamal Saghir
Director, Energy and Water
The World Bank
1818 H. Street NW
Washington, DC, USA
E-mail: jsaghir@worldbank.org

Mr Miguel Angel Sernas Morales
GE Energy
Marietta, GA
1176 Stream View Way 30062
USA
Phone: 678 844 5111
E-mail: miguel.sernas@ge.com

Ms Judith Siegel
President
Energy and Security Group
Reston, VA, USA
Phone: 703-464-0561
E-mail: judy@energyandsecurity.com

Ms Katherine Sierra
Vice-President, Infrastructure
The World Bank
Washington, DC, USA
E-mail: ksierra@worldbank.org

Mr Griffin Thompson
Senior Energy Advisor
US Department of State
2201 C Street NW
Suite 7821
Washington, DC, USA
Phone: 202 647-1139
E-mail: ThompsonGM@state.gov

Ms Xiaodong Wang
Energy Specialist
The World Bank
USA
E-mail: xwang1@worldbank.org

Mr Mark Webster
Managing Director
EESD, LLC
1208 Princess Street
Alexandria, VA, USA
Phone: +1 703 582 0070
Fax: +1 703 997 1326
E-mail: mark.webster@eesd.com

Dr Maria Luise Christine Woerlen
GEF
MSN G6 - 602
1818 H Street
Washington, DC, USA
Phone: +1 202 473 5196
Fax: +1 202 522 3240
E-mail: cwoerlen@thegef.org

Mr Dana Younger
Senior Adviser, Renewable Energy and Sustainability,
Infrastructure Department
International Finance Corporation
USA
E-mail: dyounger@ifc.org

List of Formal Reports on Completed Activities

Region/Country	Activity/Report Title	Date	Number
	SUB-SAHARAN AFRICA (AFR)		
Africa Regional	Anglophone Africa Household Energy Workshop (English)	07/88	085/88
	Regional Power Seminar on Reducing Electric Power System Losses in Africa (English)	08/88	087/88
	Institutional Evaluation of EGL (English)	02/89	098/89
	Biomass Mapping Regional Workshops (English)	05/89	--
	Francophone Household Energy Workshop (French)	08/89	--
	Interafrican Electrical Engineering College: Proposals for Short- and Long-Term Development (English)	03/90	112/90
	Biomass Assessment and Mapping (English)	03/90	--
	Symposium on Power Sector Reform and Efficiency Improvement in Sub-Saharan Africa (English)	06/96	182/96
	Commercialization of Marginal Gas Fields (English)	12/97	201/97
	Commercializing Natural Gas: Lessons from the Seminar in Nairobi for Sub-Saharan Africa and Beyond	01/00	225/00
	Africa Gas Initiative — Main Report: Volume I	02/01	240/01
	First World Bank Workshop on the Petroleum Products Sector in Sub-Saharan Africa	09/01	245/01
	Ministerial Workshop on Women in Energy	10/01	250/01
	and Poverty Reduction: Proceedings from a Multi-Sector	03/03	266/03
	and Multi-Stakeholder Workshop Addis Ababa, Ethiopia, October 23-25, 2002		
	Opportunities for Power Trade in the Nile Basin: Final Scoping Study	01/04	277/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Dakar, Sénégal, du 4 au 6 février 2003 (French Only)	01/04	278/04
	Énergies modernes et réduction de la pauvreté: Un atelier multi-sectoriel. Actes de l'atelier régional. Douala, Cameroun du 16-18 juillet 2003. (French Only)	09/04	286/04
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshops held in Africa	01/05	298/05
	Power Sector Reform in Africa: Assessing the Impact on Poor People	08/05	306/05
	The Vulnerability of African Countries to Oil Price Shocks: Major Factors and Policy Options. The Case of Oil Importing Countries	08/05	308/05
Angola	Energy Assessment (English and Portuguese)	05/89	4708-ANG
	Power Rehabilitation and Technical Assistance (English)	10/91	142/91
	Africa Gas Initiative - Angola: Volume II	02/01	240/01

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Benin	Energy Assessment (English and French)	06/85	5222-BEN
Botswana	Energy Assessment (English)	09/84	4998-BT
	Pump Electrification Prefeasibility Study (English)	01/86	047/86
	Review of Electricity Service Connection Policy (English)	07/87	071/87
	Tuli Block Farms Electrification Study (English)	07/87	072/87
	Household Energy Issues Study (English)	02/88	--
	Urban Household Energy Strategy Study (English)	05/91	132/91
Burkina Faso	Energy Assessment (English and French)	01/86	5730-BUR
	Technical Assistance Program (English)	03/86	052/86
	Urban Household Energy Strategy Study (English and French)	06/91	134/91
Burundi	Energy Assessment (English)	06/82	3778-BU
	Petroleum Supply Management (English)	01/84	012/84
Burundi	Status Report (English and French)	02/84	011/84
	Presentation of Energy Projects for the Fourth Five Year Plan (1983-1987) (English and French)	05/85	036/85
	Improved Charcoal Cookstove Strategy (English and French)	09/85	042/85
	Peat Utilization Project (English)	11/85	046/85
	Energy Assessment (English and French)	01/92	9215-BU
Cameroon	Africa Gas Initiative – Cameroon: Volume III	02/01	240/01
Cape Verde	Energy Assessment (English and Portuguese)	08/84	5073-CV
	Household Energy Strategy Study (English)	02/90	110/90
Central African Republic	Energy Assessment (French)	08/92	9898-CAR
Chad	Elements of Strategy for Urban Household Energy The Case of N'djamena (French)	12/93	160/94
Comoros	Energy Assessment (English and French)	01/88	7104-COM
	In Search of Better Ways to Develop Solar Markets: The Case of Comoros	05/00	230/00
Congo	Energy Assessment (English)	01/88	6420-COB
	Power Development Plan (English and French)	03/90	106/90
	Africa Gas Initiative – Congo: Volume IV	02/01	240/01
Côte d'Ivoire	Energy Assessment (English and French)	04/85	5250-IVC
	Improved Biomass Utilization (English and French)	04/87	069/87
	Power System Efficiency Study (English)	12/87	
	Power Sector Efficiency Study (French)	02/92	140/91
	Project of Energy Efficiency in Buildings (English)	09/95	175/95
	Africa Gas Initiative – Côte d'Ivoire: Volume V	02/01	240/01
Ethiopia	Energy Assessment (English)	07/84	4741-ET
	Power System Efficiency Study (English)	10/85	045/85
	Agricultural Residue Briquetting Pilot Project (English)	12/86	062/86
	Bagasse Study (English)	12/86	063/86
	Cooking Efficiency Project (English)	12/87	
	Energy Assessment (English)	02/96	179/96
Gabon	Energy Assessment (English)	07/88	6915-GA
	Africa Gas Initiative – Gabon: Volume VI	02/01	240/01
The Gambia	Energy Assessment (English)	11/83	4743-GM
	Solar Water Heating Retrofit Project (English)	02/85	030/85
	Solar Photovoltaic Applications (English)	03/85	032/85
	Petroleum Supply Management Assistance (English)	04/85	035/85

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Ghana	Energy Assessment (English)	11/86	6234-GH
	Energy Rationalization in the Industrial Sector (English)	06/88	084/88
	Sawmill Residues Utilization Study (English)	11/88	074/87
	Industrial Energy Efficiency (English)	11/92	148/92
	Corporatization of Distribution Concessions through Capitalization	12/03	272/03
Guinea	Energy Assessment (English)	11/86	6137-GUI
	Household Energy Strategy (English and French)	01/94	163/94
Guinea Bissau	Energy Assessment (English and Portuguese)	08/84	5083-GUB
	Recommended Technical Assistance Projects (English & Portuguese)	04/85	033/85
	Management Options for the Electric Power and Water Supply Subsectors (English)	02/90	100/90
	Power and Water Institutional Restructuring (French)	04/91	118/91
Kenya	Energy Assessment (English)	05/82	3800 KE
	Power System Efficiency Study (English)	03/84	014/84
	Status Report (English)	05/84	016/84
	Coal Conversion Action Plan (English)	02/87	--
Kenya	Solar Water Heating Study (English)	02/87	066/87
	Peri-Urban Woodfuel Development (English)	10/87	076/87
	Power Master Plan (English)	11/87	--
	Power Loss Reduction Study (English)	09/96	186/96
	Implementation Manual: Financing Mechanisms for Solar Electric Equipment	07/00	231/00
Lesotho	Energy Assessment (English)	01/84	4676-LSO
Liberia	Energy Assessment (English)	12/84	5279-LBR
	Recommended Technical Assistance Projects (English)	06/85	038/85
	Power System Efficiency Study (English)	12/87	081/87
Madagascar	Energy Assessment (English)	01/87	5700-MAG
	Power System Efficiency Study (English and French)	12/87	075/87
	Environmental Impact of Woodfuels (French)	10/95	176/95
Malawi	Energy Assessment (English)	08/82	3903-MAL
	Technical Assistance to Improve the Efficiency of Fuelwood Use in the Tobacco Industry (English)	11/83	009/83
	Status Report (English)	01/84	013/84
Mali	Energy Assessment (English and French)	11/91	8423-MLI
	Household Energy Strategy (English and French)	03/92	147/92
Islamic Republic of Mauritania	Energy Assessment (English and French)	04/85	5224-MAU
	Household Energy Strategy Study (English and French)	07/90	123/90
Mauritius	Energy Assessment (English)	12/81	3510-MAS
	Status Report (English)	10/83	008/83
	Power System Efficiency Audit (English)	05/87	070/87
	Bagasse Power Potential (English)	10/87	077/87
	Energy Sector Review (English)	12/94	3643-MAS
Mozambique	Energy Assessment (English)	01/87	6128-MOZ
	Household Electricity Utilization Study (English)	03/90	113/90
	Electricity Tariffs Study (English)	06/96	181/96
	Sample Survey of Low Voltage Electricity Customers	06/97	195/97
Namibia	Energy Assessment (English)	03/93	11320-NAM

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Niger	Energy Assessment (French)	05/84	4642-NIR
	Status Report (English and French)	02/86	051/86
	Improved Stoves Project (English and French)	12/87	080/87
	Household Energy Conservation and Substitution (English and French)	01/88	082/88
Nigeria	Energy Assessment (English)	08/83	4440-UNI
	Energy Assessment (English)	07/93	11672-UNI
	Strategic Gas Plan	02/04	279/04
Rwanda	Energy Assessment (English)	06/82	3779-RW
	Status Report (English and French)	05/84	017/84
	Improved Charcoal Cookstove Strategy (English and French)	08/86	059/86
	Improved Charcoal Production Techniques (English and French)	02/87	065/87
	Energy Assessment (English and French)	07/91	8017-RW
	Commercialization of Improved Charcoal Stoves and Carbonization Techniques Mid-Term Progress Report (English and French)	12/91	141/91
SADC	SADC Regional Power Interconnection Study, Vols. I-IV (English)	12/93	-
SADCC	SADCC Regional Sector: Regional Capacity-Building Program for Energy Surveys and Policy Analysis (English)	11/91	-
Sao Tome and Principe	Energy Assessment (English)	10/85	5803-STP
Senegal	Energy Assessment (English)	07/83	4182-SE
	Status Report (English and French)	10/84	025/84
Senegal	Industrial Energy Conservation Study (English)	05/85	037/85
	Preparatory Assistance for Donor Meeting (English and French)	04/86	056/86
	Urban Household Energy Strategy (English)	02/89	096/89
	Industrial Energy Conservation Program (English)	05/94	165/94
Seychelles	Energy Assessment (English)	01/84	4693-SEY
	Electric Power System Efficiency Study (English)	08/84	021/84
Sierra Leone	Energy Assessment (English)	10/87	6597-SL
Somalia	Energy Assessment (English)	12/85	5796-SO
Republic of South Africa	Options for the Structure and Regulation of Natural Gas Industry (English)	05/95	172/95
Sudan	Management Assistance to the Ministry of Energy and Mining	05/83	003/83
	Energy Assessment (English)	07/83	4511-SU
	Power System Efficiency Study (English)	06/84	018/84
	Status Report (English)	11/84	026/84
	Wood Energy/Forestry Feasibility (English)	07/87	073/87
Swaziland	Energy Assessment (English)	02/87	6262-SW
	Household Energy Strategy Study	10/97	198/97
Tanzania	Energy Assessment (English)	11/84	4969-TA
	Peri-Urban Woodfuels Feasibility Study (English)	08/88	086/88
	Tobacco Curing Efficiency Study (English)	05/89	102/89
	Remote Sensing and Mapping of Woodlands (English)	06/90	--
	Industrial Energy Efficiency Technical Assistance (English)	08/90	122/90
	Power Loss Reduction Volume 1: Transmission and Distribution System Technical Loss Reduction and Network Development (English)	06/98	204A/98
	Power Loss Reduction Volume 2: Reduction of Non-Technical Losses (English)	06/98	204B/98

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Togo	Energy Assessment (English)	06/85	5221-TO
	Wood Recovery in the Nangbeto Lake (English and French)	04/86	055/86
	Power Efficiency Improvement (English and French)	12/87	078/87
Uganda	Energy Assessment (English)	07/83	4453-UG
	Status Report (English)	08/84	020/84
	Institutional Review of the Energy Sector (English)	01/85	029/85
	Energy Efficiency in Tobacco Curing Industry (English)	02/86	049/86
	Fuelwood/Forestry Feasibility Study (English)	03/86	053/86
	Power System Efficiency Study (English)	12/88	092/88
	Energy Efficiency Improvement in the Brick and Tile Industry (English)	02/89	097/89
	Tobacco Curing Pilot Project (English)	03/89	UNDP Terminal Report
	Energy Assessment (English)	12/96	193/96
	Rural Electrification Strategy Study	09/99	221/99
Zaire	Energy Assessment (English)	05/86	5837-ZR
Zambia	Energy Assessment (English)	01/83	4110-ZA
	Status Report (English)	08/85	039/85
	Energy Sector Institutional Review (English)	11/86	060/86
	Power Subsector Efficiency Study (English)	02/89	093/88
	Energy Strategy Study (English)	02/89	094/88
	Urban Household Energy Strategy Study (English)	08/90	121/90
Zimbabwe	Energy Assessment (English)	06/82	3765-ZIM
	Power System Efficiency Study (English)	06/83	005/83
	Status Report (English)	08/84	019/84
	Power Sector Management Assistance Project (English)	04/85	034/85
Zimbabwe	Power Sector Management Institution Building (English)	09/89	--
	Petroleum Management Assistance (English)	12/89	109/89
	Charcoal Utilization Pre-feasibility Study (English)	06/90	119/90
	Integrated Energy Strategy Evaluation (English)	01/92	8768-ZIM
	Energy Efficiency Technical Assistance Project: Strategic Framework for a National Energy Efficiency Improvement Program (English)	04/94	--
	Capacity Building for the National Energy Efficiency Improvement Programme (NEEIP) (English)	12/94	--
	Rural Electrification Study	03/00	228/00
	EAST ASIA AND PACIFIC (EAP)		
Asia Regional	Pacific Household and Rural Energy Seminar (English)	11/90	--
China	County-Level Rural Energy Assessments (English)	05/89	101/89
	Fuelwood Forestry Preinvestment Study (English)	12/89	105/89
	Strategic Options for Power Sector Reform in China (English)	07/93	156/93
	Energy Efficiency and Pollution Control in Township and Village Enterprises (TVE) Industry (English)	11/94	168/94
	Energy for Rural Development in China: An Assessment Based on a Joint Chinese/ESMAP Study in Six Counties (English)	06/96	183/96
	Improving the Technical Efficiency of Decentralized Power Companies	09/99	222/99
	Air Pollution and Acid Rain Control: The Case of Shijiazhuang City and the Changsha Triangle Area	10/03	267/03

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	Toward a Sustainable Coal Sector In China	07/04	287/04
	Demand Side Management in a Restructured Industry: How Regulation and Policy Can Deliver Demand-Side Management Benefits to a Growing Economy and a Changing Power System	12/05	314/05
Fiji	Energy Assessment (English)	06/83	4462-FIJ
Indonesia	Energy Assessment (English)	11/81	3543-IND
	Status Report (English)	09/84	022/84
	Power Generation Efficiency Study (English)	02/86	050/86
	Energy Efficiency in the Brick, Tile and Lime Industries (English)	04/87	067/87
	Diesel Generating Plant Efficiency Study (English)	12/88	095/88
	Urban Household Energy Strategy Study (English)	02/90	107/90
	Biomass Gasifier Preinvestment Study Vols. I & II (English)	12/90	124/90
	Prospects for Biomass Power Generation with Emphasis on Palm Oil, Sugar, Rubberwood and Plywood Residues (English)	11/94	167/94
Lao PDR	Urban Electricity Demand Assessment Study (English)	03/93	154/93
	Institutional Development for Off-Grid Electrification	06/99	215/99
Malaysia	Sabah Power System Efficiency Study (English)	03/87	068/87
	Gas Utilization Study (English)	09/91	9645-MA
Mongolia	Energy Efficiency in the Electricity and District Heating Sectors	10/01	247/01
	Improved Space Heating Stoves for Ulaanbaatar	03/02	254/02
	Impact of Improved Stoves on Indoor Air Quality in Ulaanbaatar, Mongolia	11/05	313/05
Myanmar	Energy Assessment (English)	06/85	5416-BA
Papua New Guinea	Energy Assessment (English)	06/82	3882-PNG
Papua New Guinea	Status Report (English)	07/83	006/83
	Institutional Review in the Energy Sector (English)	10/84	023/84
	Power Tariff Study (English)	10/84	024/84
Philippines	Commercial Potential for Power Production from Agricultural Residues (English)	12/93	157/93
	Energy Conservation Study (English)	08/94	--
	Strengthening the Non-Conventional and Rural Energy Development Program in the Philippines: A Policy Framework and Action Plan	08/01	243/01
	Rural Electrification and Development in the Philippines: Measuring the Social and Economic Benefits	05/02	255/02
Solomon Islands	Energy Assessment (English)	06/83	4404-SOL
	Energy Assessment (English)	01/92	979-SOL
South Pacific	Petroleum Transport in the South Pacific (English)	05/86	--
Thailand	Energy Assessment (English)	09/85	5793-TH
	Rural Energy Issues and Options (English)	09/85	044/85
	Accelerated Dissemination of Improved Stoves and Charcoal Kilns (English)	09/87	079/87
	Northeast Region Village Forestry and Woodfuels Preinvestment Study (English)	02/88	083/88
	Impact of Lower Oil Prices (English)	08/88	--
	Coal Development and Utilization Study (English)	10/89	--

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	Why Liberalization May Stall in a Mature Power Market: A Review of the Technical and Political Economy Factors that Constrained the Electricity Sector Reform in Thailand 1998-2002	12/03	270/03
	Reducing Emissions from Motorcycles in Bangkok	10/03	275/03
Tonga	Energy Assessment (English)	06/85	5498-TON
Vanuatu	Energy Assessment (English)	06/85	5577-VA
Vietnam	Rural and Household Energy-Issues and Options (English)	01/94	161/94
	Power Sector Reform and Restructuring in Vietnam: Final Report to the Steering Committee (English and Vietnamese)	09/95	174/95
	Household Energy Technical Assistance: Improved Coal Briquetting and Commercialized Dissemination of Higher Efficiency Biomass and Coal Stoves (English)	01/96	178/96
	Petroleum Fiscal Issues and Policies for Fluctuating Oil Prices In Vietnam	02/01	236/01
	An Overnight Success: Vietnam's Switch to Unleaded Gasoline	08/02	257/02
	The Electricity Law for Vietnam — Status and Policy Issues — The Socialist Republic of Vietnam	08/02	259/02
	Petroleum Sector Technical Assistance for the Revision of the Existing Legal and Regulatory Framework	12/03	269/03
Western Samoa	Energy Assessment (English)	06/85	5497-WSO
	SOUTH ASIA (SAS)		
Bangladesh	Energy Assessment (English)	10/82	3873-BD
	Priority Investment Program (English)	05/83	002/83
	Status Report (English)	04/84	015/84
	Power System Efficiency Study (English)	02/85	031/85
	Small Scale Uses of Gas Pre-feasibility Study (English)	12/88	--
	Reducing Emissions from Baby-Taxis in Dhaka	01/02	253/02
India	Opportunities for Commercialization of Non-conventional Energy Systems (English)	11/88	091/88
	Maharashtra Bagasse Energy Efficiency Project (English)	07/90	120/90
	Mini-Hydro Development on Irrigation Dams and Canal Drops Vols. I, II and III (English)	07/91	139/91
	WindFarm Pre-Investment Study (English)	12/92	150/92
	Power Sector Reform Seminar (English)	04/94	166/94
	Environmental Issues in the Power Sector (English)	06/98	205/98
	Environmental Issues in the Power Sector: Manual for Environmental Decision Making (English)	06/99	213/99
	Household Energy Strategies for Urban India: The Case of Hyderabad	06/99	214/99
	Greenhouse Gas Mitigation In the Power Sector: Case Studies From India	02/01	237/01
	Energy Strategies for Rural India: Evidence from Six States	08/02	258/02
	Household Energy, Indoor Air Pollution, and Health	11/02	261/02
	Access of the Poor to Clean Household Fuels	07/03	263/03
	The Impact of Energy on Women's Lives in Rural India	01/04	276/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Rajasthan	10/04	292/04
	Environmental Issues in the Power Sector: Long-Term Impacts And Policy Options for Karnataka	10/04	293/04

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Nepal	Energy Assessment (English)	08/83	4474-NEP
	Status Report (English)	01/85	028/84
	Energy Efficiency & Fuel Substitution in Industries (English)	06/93	158/93
Pakistan	Household Energy Assessment (English)	05/88	--
	Assessment of Photovoltaic Programs, Applications, and Markets (English)	10/89	103/89
	National Household Energy Survey and Strategy Formulation Study: Project Terminal Report (English)	03/94	--
	Managing the Energy Transition (English)	10/94	--
	Lighting Efficiency Improvement Program Phase 1: Commercial Buildings Five Year Plan (English)	10/94	--
	Clean Fuels	10/01	246/01
	Household Use of Commercial Energy	05/06	320/06
Regional	Toward Cleaner Urban Air in South Asia: Tackling Transport Pollution, Understanding Sources.	03/04	281/04
Sri Lanka	Energy Assessment (English)	05/82	3792-CE
	Power System Loss Reduction Study (English)	07/83	007/83
	Status Report (English)	01/84	010/84
	Industrial Energy Conservation Study (English)	03/86	054/86
	Sustainable Transport Options for Sri Lanka: Vol. I	02/03	262/03
	Greenhouse Gas Mitigation Options in the Sri Lanka Power Sector: Vol. II	02/03	262/03
	Sri Lanka Electric Power Technology Assessment (SLEPTA): Vol. III	02/03	262/03
	Energy and Poverty Reduction: Proceedings from South Asia Practitioners Workshop How Can Modern Energy Services Contribute to Poverty Reduction? Colombo, Sri Lanka, June 2-4, 2003	11/03	268/03
	EUROPE AND CENTRAL ASIA (ECA)		
Armenia	Development of Heat Strategies for Urban Areas of Low-income Transition Economies. Urban Heating Strategy for the Republic Of Armenia. *Including a Summary of a Heating Strategy for the Kyrgyz Republic*	04/04	282/04
Bulgaria	Natural Gas Policies and Issues (English)	10/96	188/96
	Energy Environment Review	10/02	260/02
Central Asia and The Caucasus	Cleaner Transport Fuels in Central Asia and the Caucasus	08/01	242/01
Central and Eastern Europe	Power Sector Reform in Selected Countries	07/97	196/97
	Increasing the Efficiency of Heating Systems in Central and Eastern Europe and the Former Soviet Union (English and Russian)	08/00	234/00
	The Future of Natural Gas in Eastern Europe (English)	08/92	149/92
Kazakhstan	Natural Gas Investment Study, Volumes 1, 2 & 3	12/97	199/97
Kazakhstan & Kyrgyzstan	Opportunities for Renewable Energy Development	11/97	16855-KAZ
Poland	Energy Sector Restructuring Program Vols. I-V (English)	01/93	153/93
	Natural Gas Upstream Policy (English and Polish)	08/98	206/98
	Energy Sector Restructuring Program: Establishing the Energy Regulation Authority	10/98	208/98
Portugal	Energy Assessment (English)	04/84	4824-PO

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Romania	Natural Gas Development Strategy (English)	12/96	192/96
	Private Sector Participation in Market-Based Energy-Efficiency Financing Schemes: Lessons Learned from Romania and International Experiences.	11/03	274/03
Slovenia	Workshop on Private Participation in the Power Sector (English)	02/99	211/99
Turkey	Energy Assessment (English)	03/83	3877-TU
	Energy and the Environment: Issues and Options Paper	04/00	229/00
	Energy and Environment Review: Synthesis Report	12/03	273/03
	MIDDLE EAST AND NORTH AFRICA (MNA)		
Arab Republic of Egypt	Energy Assessment (English)	10/96	189/96
	Energy Assessment (English and French)	03/84	4157-MOR
	Status Report (English and French)	01/86	048/86
Morocco	Energy Sector Institutional Development Study (English and French)	07/95	173/95
	Natural Gas Pricing Study (French)	10/98	209/98
	Gas Development Plan Phase II (French)	02/99	210/99
Syria	Energy Assessment (English)	05/86	5822-SYR
	Electric Power Efficiency Study (English)	09/88	089/88
	Energy Efficiency Improvement in the Cement Sector (English)	04/89	099/89
	Energy Efficiency Improvement in the Fertilizer Sector (English)	06/90	115/90
Tunisia	Fuel Substitution (English and French)	03/90	--
	Power Efficiency Study (English and French)	02/92	136/91
	Energy Management Strategy in the Residential and Tertiary Sectors (English)	04/92	146/92
	Renewable Energy Strategy Study, Volume I (French)	11/96	190A/96
	Renewable Energy Strategy Study, Volume II (French)	11/96	190B/96
	Rural Electrification in Tunisia: National Commitment, Efficient Implementation and Sound Finances	08/05	307/05
Yemen	Energy Assessment (English)	12/84	4892-YAR
	Energy Investment Priorities (English)	02/87	6376-YAR
	Household Energy Strategy Study Phase I (English)	03/91	126/91
	Household Energy Supply and Use in Yemen. Volume I: Main Report and Volume II: Annexes	12/05	315/05
	LATIN AMERICA AND THE CARIBBEAN REGION (LCR)		
LCR Regional	Regional Seminar on Electric Power System Loss Reduction in the Caribbean (English)	07/89	--
	Elimination of Lead in Gasoline in Latin America and the Caribbean (English and Spanish)	04/97	194/97
	Elimination of Lead in Gasoline in Latin America and the Caribbean - Status Report (English and Spanish)	12/97	200/97
	Harmonization of Fuels Specifications in Latin America and the Caribbean (English and Spanish)	06/98	203/98
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop held in Bolivia	06/05	202/05
	Power Sector Reform and the Rural Poor in Central America	12/04	297/04
	Estudio Comparativo Sobre la Distribución de la Renta Petrolera en Bolivia, Colombia, Ecuador y Perú	08/05	304/05

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	OECS Energy Sector Reform and Renewable Energy/Energy Efficiency Options	02/06	317/06
	The Landfill Gas-to-Energy Initiative for Latin America and the Caribbean	02/06	318/06
Bolivia	Energy Assessment (English)	04/83	4213-BO
	National Energy Plan (English)	12/87	--
	La Paz Private Power Technical Assistance (English)	11/90	111/90
	Pre-feasibility Evaluation Rural Electrification and Demand Assessment (English and Spanish)	04/91	129/91
	National Energy Plan (Spanish)	08/91	131/91
	Private Power Generation and Transmission (English)	01/92	137/91
	Natural Gas Distribution: Economics and Regulation (English)	03/92	125/92
	Natural Gas Sector Policies and Issues (English and Spanish)	12/93	164/93
	Household Rural Energy Strategy (English and Spanish)	01/94	162/94
	Preparation of Capitalization of the Hydrocarbon Sector	12/96	191/96
	Introducing Competition into the Electricity Supply Industry in Developing Countries: Lessons from Bolivia	08/00	233/00
	Final Report on Operational Activities Rural Energy and Energy Efficiency	08/00	235/00
	Oil Industry Training for Indigenous People: The Bolivian Experience (English and Spanish)	09/01	244/01
	Capacitación de Pueblos Indígenas en la Actividad Petrolera. Fase II	07/04	290/04
Boliva-Brazil	Best Practices in Mainstreaming Environmental & Social Safeguards Into Gas Pipeline Projects	07/06	322/06
	Estudio Sobre Aplicaciones en Pequeña Escala de Gas Natural	07/04	291/04
Brazil	Energy Efficiency & Conservation: Strategic Partnership for Energy Efficiency in Brazil (English)	01/95	170/95
	Hydro and Thermal Power Sector Study	09/97	197/97
	Rural Electrification with Renewable Energy Systems in the Northeast: A Preinvestment Study	07/00	232/00
	Reducing Energy Costs in Municipal Water Supply Operations	07/03	265/03
	"Learning-while-doing" Energy M&T on the Brazilian Frontlines		
Chile	Energy Sector Review (English)	08/88	7129-CH
Colombia	Energy Strategy Paper (English)	12/86	--
	Power Sector Restructuring (English)	11/94	169/94
	Energy Efficiency Report for the Commercial and Public Sector (English)	06/96	184/96
Costa Rica	Energy Assessment (English and Spanish)	01/84	4655-CR
	Recommended Technical Assistance Projects (English)	11/84	027/84
	Forest Residues Utilization Study (English and Spanish)	02/90	108/90
Dominican Republic	Energy Assessment (English)	05/91	8234-DO
Ecuador	Energy Assessment (Spanish)	12/85	5865-EC
	Energy Strategy Phase I (Spanish)	07/88	--
	Energy Strategy (English)	04/91	--
	Private Mini-hydropower Development Study (English)	11/92	--
	Energy Pricing Subsidies and Interfuel Substitution (English)	08/94	11798-EC
	Energy Pricing, Poverty and Social Mitigation (English)	08/94	12831-EC
Guatemala	Issues and Options in the Energy Sector (English)	09/93	12160-GU
	Health Impacts of Traditional Fuel Use	08/04	284/04

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	Status Report (English and French)	08/85	041/85
	Household Energy Strategy (English and French)	12/91	143/91
Honduras	Energy Assessment (English)	08/87	6476-HO
	Petroleum Supply Management (English)	03/91	128/91
Jamaica	Energy Assessment (English)	04/85	5466-JM
	Petroleum Procurement, Refining, and Distribution Study (English)	11/86	061/86
	Energy Efficiency Building Code Phase I (English)	03/88	--
	Energy Efficiency Standards and Labels Phase I (English)	03/88	--
	Management Information System Phase I (English)	03/88	--
	Charcoal Production Project (English)	09/88	090/88
	FIDCO Sawmill Residues Utilization Study (English)	09/88	088/88
	Energy Sector Strategy and Investment Planning Study (English)	07/92	135/92
Mexico	Improved Charcoal Production Within Forest Management for the State of Veracruz (English and Spanish)	08/91	138/91
	Energy Efficiency Management Technical Assistance to the Comisión Nacional para el Ahorro de Energía (CONAE) (English)	04/96	180/96
	Energy Environment Review	05/01	241/01
Nicaragua	Modernizing the Fuelwood Sector in Managua and León	12/01	252/01
	Policy & Strategy for the Promotion of RE Policies in Nicaragua. (Contains CD with 3 complementary reports)	01/06	316/06
Panama	Power System Efficiency Study (English)	06/83	004/83
Paraguay	Energy Assessment (English)	10/84	5145-PA
	Recommended Technical Assistance Projects (English)	09/85	
	Status Report (English and Spanish)	09/85	043/85
	Reforma del Sector Hidrocarburos (Spanish Only)	03/06	319/06
Peru	Energy Assessment (English)	01/84	4677-PE
	Status Report (English)	08/85	040/85
	Proposal for a Stove Dissemination Program in the Sierra (English and Spanish)	02/87	064/87
	Energy Strategy (English and Spanish)	12/90	--
Peru	Study of Energy Taxation and Liberalization of the Hydrocarbons Sector (English and Spanish)	120/93	159/93
	Reform and Privatization in the Hydrocarbon Sector (English and Spanish)	07/99	216/99
	Rural Electrification	02/01	238/01
Saint Lucia	Energy Assessment (English)	09/84	5111-SLU
St. Vincent and the Grenadines	Energy Assessment (English)	09/84	5103-STV
Sub Andean	Environmental and Social Regulation of Oil and Gas Operations in Sensitive Areas of the Sub-Andean Basin (English and Spanish)	07/99	217/99
Trinidad and Tobago	Energy Assessment (English)	12/85	5930-TR

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	GLOBAL		
	Energy End Use Efficiency: Research and Strategy (English)	11/89	--
	Women and Energy -A Resource Guide		
	The International Network: Policies and Experience (English)	04/90	--
	Guidelines for Utility Customer Management and Metering (English and Spanish)	07/91	--
	Assessment of Personal Computer Models for Energy Planning in Developing Countries (English)	10/91	--
	Long-Term Gas Contracts Principles and Applications (English)	02/93	152/93
	Comparative Behavior of Firms Under Public and Private Ownership (English)	05/93	155/93
	Development of Regional Electric Power Networks (English)	10/94	--
	Round-table on Energy Efficiency (English)	02/95	171/95
	Assessing Pollution Abatement Policies with a Case Study of Ankara (English)	11/95	177/95
	A Synopsis of the Third Annual Round-table on Independent Power Projects: Rhetoric and Reality (English)	08/96	187/96
	Rural Energy and Development Round-table (English)	05/98	202/98
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	The Effect of a Shadow Price on Carbon Emission in the Energy Portfolio of the World Bank: A Carbon Backcasting Exercise (English)	02/99	212/99
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	Energy, Transportation and Environment: Policy Options for Environmental Improvement	12/99	224/99
	Privatization, Competition and Regulation in the British Electricity Industry, With Implications for Developing Countries	02/00	226/00
	Reducing the Cost of Grid Extension for Rural Electrification	02/00	227/00
	Undeveloped Oil and Gas Fields in the Industrializing World	02/01	239/01
	Best Practice Manual: Promoting Decentralized Electrification Investment	10/01	248/01
	Peri-Urban Electricity Consumers — A Forgotten but Important Group: What Can We Do to Electrify Them?	10/01	249/01
	Village Power 2000: Empowering People and Transforming Markets	10/01	251/01
	Private Financing for Community Infrastructure	05/02	256/02
	Stakeholder Involvement in Options Assessment: Promoting Dialogue in Meeting Water and Energy Needs: A Sourcebook	07/03	264/03

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	A Review of ESMAP's Energy Efficiency Portfolio	11/03	271/03
	A Review of ESMAP's Rural Energy and Renewable Energy Portfolio	04/04	280/04
	ESMAP Renewable Energy and Energy Efficiency Reports 1998-2004 (CD Only)	05/04	283/04
	Regulation of Associated Gas Flaring and Venting: A Global Overview and Lessons Learned from International Experience	08/04	285/04
	ESMAP Gender in Energy Reports and Other related Information (CD Only)	11/04	288/04
	ESMAP Indoor Air Pollution Reports and Other related Information (CD Only)	11/04	289/04
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on the Pre-Investment Funding. Berlin, Germany, April 23-24, 2003.	11/04	294/04
	Global Village Energy Partnership (GVEP) Annual Report 2003	12/04	295/04
	Energy and Poverty Reduction: Proceedings from the Global Village Energy Partnership (GVEP) Workshop on Consumer Lending and Microfinance to Expand Access to Energy Services, Manila, Philippines, May 19-21, 2004	12/04	296/04
	The Impact of Higher Oil Prices on Low Income Countries And on the Poor	03/05	299/05
	Advancing Bioenergy for Sustainable Development: Guideline For Policymakers and Investors	04/05	300/05
	ESMAP Rural Energy Reports 1999-2005	03/05	301/05
	Renewable Energy and Energy Efficiency Financing and Policy Network: Options Study and Proceedings of the International Forum	07/05	303/05
	Implementing Power Rationing in a Sensible Way: Lessons Learned and International Best Practices	08/05	305/05
	The Urban Household Energy Transition. Joint Report with RFF Press/ESMAP. ISBN 1-933115-07-6	08/05	309/05
	Pioneering New Approaches in Support of Sustainable Development In the Extractive Sector: Community Development Toolkit, also Includes a CD containing Supporting Reports	10/05	310/05
	Analysis of Power Projects with Private Participation Under Stress	10/05	311/05
	Potential for Biofuels for Transport in Developing Countries	10/05	312/05
	Experiences with Oil Funds: Institutional and Financial Aspects	06/06	321/06
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Energy Sector Management Assistance Program (ESMAP)
1818 H Street, NW
Washington, DC 20433 USA
Tel: 1.202.458.2321
Fax: 1.202.522.3018
Internet: www.worldbank.org/esmap
E-mail: esmap@worldbank.org