UN-Energy

2011

Strengthening Public-Private Partnerships to Accelerate Global Electricity Technology Deployment –

Recommendations from the Global Sustainable Electricity Partnership Survey

Acknowledgements

Partners

e8
World Energy Council
UN-Energy
US Energy Association

Key Contributors

African Development Bank
Asian Development Bank
Association of Southeast Asian Nations
Edison Electric Institute
Electric Power Research Institute
Energy for ALL
Global Environment Facility
Global Village Energy Partnership
Independent Power Producers
Inter-American Development Bank
International Alliance for Rural Electrification
International Electricity Partnership (IEP)
Pacific Power Association
R20
Renewable Energy & Energy Efficiency Partnership (REEEP)
The Energy and Resources Institute (TERI)
UN Department of Economic and Social Affairs (DESA)
United Nations Foundation
United Nations Industrial Development Organization (UNIDO)
World Bank
World Business Council for Sustainable Development
World Energy Forum
World LP Gas Association

Survey Respondent Organizations

AES Pakistan (Pvt) Limited
Alliant Energy
Arizona Public Service Company
Asian Development Bank
Atlantic Coast Energy Corporation
Bons Ventos Geradora de Energia
BASIX
Banco Nacional de Desenvolvimento Economico e Social – BNDES
Botswana Power Corporation
Ceskoslovenska Obchodni Banka
CJ Energética S.A
CMC
Commonwealth Utilities Corporation, Northern Mariana Islands
Construtora OAS
Contern Construções E Comércio LTDA
DAMP Electric
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Eletrosul Centrais Elétricas S.A.
Enel Green Power
Enel SpA
Energy Commission of Nigeria
Engevix Engenharia S/A
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Eolica Technologies
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Hydro Tasmania
Independent Power Producers Forum
InSite International – Solar Energy Unlimited
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Nicaragua Ministry of Energy and Water Resources
National Electrification Admin
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Northeast Utilities
Pacific Hydro
Panama National Energy Secretariat
Peru Ministry of Energy and Mines
Petros Pension Scheme
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ResearchPAYS, Inc.
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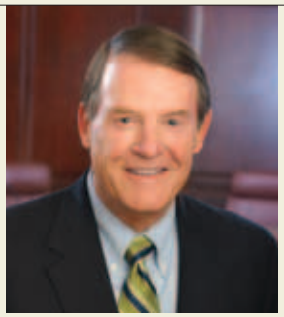
Superintendencia de Servicios Públicos de Colombia
Sustainable Energy Association of Singapore
Tractebel Energia S.A.
The Federation of Electric Power Companies, Japan
The Wind Factory International BV
The World Bank
THiNKGREEN! Global Advisors
Togo Department of Energy
Tokyo Electric Power Company
Companhia Hidrelétrica Figueirópolis S.A.
Ludesa Energética S.A.
United Nations
United Nations Foundation
World Energy Council (WEC)
World Energy Forum
Yukon Energy Corporation

Message from Mike Morris, e8 chairman



There is an old Kenyan proverb that says sticks in a bundle are unbreakable. As the current Chairman of the e8, an international group of power companies, I believe this to be true.

As the e8 has developed sustainable electricity projects and conducted human capacity building workshops in over 40 countries, we have reached out to local, national and international partners to ensure each project's success. This is why I am pleased to share the recommendations we and UN-Energy have identified for Strengthening Public-Private Partnerships to Accelerate Global Electricity Technology Deployment, supporting the principle of the Kenyan proverb.

The importance of private and public sector collaboration to bring clean, reliable electricity to those without it is strongly supported by the results of a global survey we conducted. The results emphasize the:

- Role of public-private partnerships' best practices to effectively establish energy policies;
- Importance of long-term stable policy frameworks to meet goals; and
- Integration of partnerships into electricity & energy services development plans.

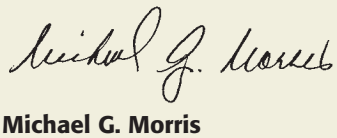
Further, the survey results show that by coupling low- and zero-emitting power technologies with enabling public policies and financing, strong synergies can result. Electricity providers should be able to more effectively stimulate the growth of goods, services, jobs and economies.

The 12 electricity companies representing 10 countries in the e8 have learned this from their individual global sustainable electricity partnerships as well as their collective efforts as the e8. These companies pool their talent and financial resources to promote global sustainable electricity development by constructing small generating projects with local partners in developing countries. In addition, the e8 provides human capacity-building training programs for engineering and maintenance of the projects and financing dialogues that assess project risks, and other programs related to generation, management, and efficient use of electricity. By the end of 2011, we, UN-Energy, the World Energy Council and other partners will have met with energy and finance ministers from over 50 countries and worked on policy changes they want to make to become more attractive to investors in electricity projects.

We have a strong team in our e8 membership: American Electric Power, Duke Energy (United States), Electricite de France (France), Eletrobrás (Brazil), Enel (Italy), Hydro-Quebec (Canada), Kansai (Japan), RusHydro (Russia), RWE (Germany), and Tokyo Electric Power Company (Japan). State Grid Corporation (China) and Eskom (South Africa) will become members on June 2, 2011. Comisión Fenderal de Electricidad (Mexico) has also joined the e8 as an official partner. Our name will change to Global Sustainable Electricity Partnership in recognition of this expanded membership.

We believe that progress toward the UN's Millennium Development Goal of reducing extreme poverty by 2030 can be greatly accelerated, in an attractive financial risk-reward atmosphere created by public-private partnerships, if countries establish technology deployment plans with enabling public policies.

The e8 and UN-Energy have pledged to support countries willing to implement these best practices by leveraging our expertise as guided by RWE, the next e8 chair company, especially since 2012 is the United Nation's International Year for Sustainable Energy for All.



Michael G. Morris
Chairman of e8 and
Chairman and CEO,
American Electric Power

Vale dos Ventos Wind Power Complex, Mataraca City, Pernambuco State, Brazil

Message from UN-Energy

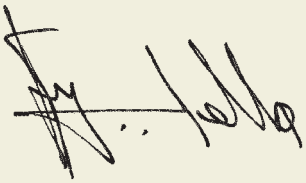
In April 2010 the Secretary-General's Advisory Group on Energy and Climate Change, which I had the honour to chair, released its recommendations in "Energy for a Sustainable Future". This report proposes two ambitious but achievable global goals: ensuring universal access to modern energy services and reducing global energy intensity by 40% by 2030. To meet these goals, five actions were outlined:

- A global campaign should be launched in support of Energy for Sustainable Development.
- All countries should prioritize the goals through adoption of appropriate national strategies.
- Finance, including innovative financial mechanisms and climate finance, should be made available by the international community.
- Private Sector participation in achieving the goals should be emphasized and encouraged.
- The United Nations system should make Energy for Sustainable Development a major institutional priority.

While we are working diligently to follow-up on all of these actions, the engagement between the UN system and the private sector is, I believe, fundamental to achieving the scale and pace of change required. Thus, I am very pleased that the twelve major international power companies that comprise the e8 and UN-Energy have worked closely to identify ways that public-private partnerships can be designed and effectively implemented. It is clear that these partnerships will be essential building blocks to meeting our shared vision.

I believe that the nine recommendations described in this e8 and UN-Energy report, once fully implemented by the Members and country teams, will quicken the pace of clean energy technology deployment, increase capital flows and improve the lives of billions of people. They will also serve as important foundations for the International Year of Sustainable Energy for All in 2012.

I congratulate all who have contributed to this report's important findings, and look forward to working together to reap the benefits of these powerful partnerships.



Kandeh K. Yumkella
Director-General, UNIDO,
and Chair of UN-Energy

"Coming together is a beginning. Keeping together is progress. Working together is success".

— Henry Ford – founder of Ford Motor Company

Executive Summary

The International Energy Agency estimates that 1.4 billion people will still lack access to electricity in 2030. Potentially, many more will not enjoy modern electric services. In the summer of 2010, the e8 with its partnering organizations launched the global initiative for "Strengthening Public-Private Partnerships" to accelerate sustainable electricity development for on- and off-grid areas. The focus of the initiative is to jointly identify the most effective and meaningful best practices of partnerships to support the global deployment of low- and zero-emitting electricity technologies at national, regional and global levels.

A survey of practitioners from the private, public and civil society sectors yielded information with supporting case studies identifying policy and project characteristics that establish an attractive financial risk-reward atmosphere to bring low-carbon electricity projects to completion. Nine recommendations distill the perspectives and experience of the survey respondents.

Supporting Policies for Public-Private Partnerships

Recommendation 1: *Public-Private Partnership Strategy*
Establish a formal national energy development plan with a strong legislative framework and a clearly defined public-private partnership strategy. This will enable reconciling security of supply, climate change and economic growth. Sustainable electricity policies will foster economic and social development and mitigate the financial risk for its investors. Establishment of these policy elements will remove barriers, stimulate investment, establish stable legal and regulatory frameworks, and provide incentives and financing to bring clean electricity to unserved and underserved populations.

Recommendation 2: *Cost Recovery Policies*
Provide assured cost recovery and profit potential for investors by creating national energy plans backed by legislation and regulation that establish a commitment to the promotion of low-carbon technologies.

Recommendation 3: *RDD&D Funding*
Provide stable, sufficient funding for research, development, demonstration and deployment (RDD&D) of a wide range of emerging clean electricity technologies. RDD&D is very expensive. Public-private partnerships will have to change the manner of how RDD&D is financed in order to lead the way to decarbonization of the electricity supply.

Defining Effective Public-Private Partnerships

Recommendation 4: *Benefits of Electrification*
Maximize benefits brought to communities from new and expanded electrification. These public-private partnerships will raise the standard of living for recipients and support communities in their economic and social development through improved access to electricity.

Recommendation 5: *Access to Capital*
Optimize the private sector's ability to bring many financing alternatives for electricity projects and to design, construct, operate and maintain them. Over 95 percent of respondents agreed that the private sector's most effective contribution to a public-private partnership was in the provision of capital.

Recommendation 6: *Goal Development*
Set electricity development goals and timetables for long-term technology deployment under national energy plans. One of the key strengths of the public sector is the ability to develop long-term, low-risk policies that can entice financial contributors and project developers to invest in a project.

Recommendation 7: *Effective Partnerships*
Sustain strong partnerships with effective communication, well-defined roles and responsibilities, and continuous commitment.

Coco River crossing, Wiwili, Nicaragua

Financing

Recommendation 8: *Secure Income*
Use power purchase agreements (PPAs) with the private sector for greatest certainty regarding long-term investments. Over three quarters of respondents stated that the use of PPA is extremely to very effective in securing financing to deploy low-carbon technologies. The responses of those surveyed from financial institutions reinforced the importance of mitigating financial risk through long-term, secure income streams.

Moving Forward

Recommendation 9: *Implementation*
Implement these recommendations by increasing the alignment of public, private and civil society sector practitioner efforts with willing countries.

The e8 (under our new name, Global Sustainable Electricity Partnership) together with its partners pledge to assist utilities in developing countries to pursue various public and private avenues for sustainable, universal electrification. In addition, we will support participating organizations and developing countries interested in implementing the recommendations found in this report.

I. Background

The e8, a global sustainable electricity partnering organization composed of the world's leading electricity companies, is advancing the concept of "Strengthening Public-Private Partnerships" as its theme for 2010—2011. While working with its partners in capital technology deployment projects and human capacity-building workshops, the e8 recognized the urgent need for optimizing collaboration in a global, coordinated and integrated manner to address universal access to electricity.

The e8 is working with the United Nations, developing country governments and local utility company partners to promote electricity technology deployment through the construction and operation of small power projects and human capacity-building activities. To date, the e8 has shared its experience in engineering, environmental protection, financing and public policy development with over 40 countries in all regions of the world.

In the summer of 2010, the e8 and its partnering organizations launched the global initiative for "Strengthening Public-Private Partnerships" to advance sustainable electricity development. The focus of the initiative is to jointly identify effective and meaningful partnerships that support and promote the global deployment of low- and zero-emitting electricity technologies at national, regional and international levels.

www.e8.org

Purpose

Electricity is the key energy source that, when properly managed, allows for simultaneous significant economic growth, improvement of social conditions and emissions reduction. To accomplish electricity sustainability, power sources must be more efficient and produce lower levels of carbon emissions. In addition, synergic power grid configurations (from generation to distribution) and more efficient electrical devices should be widely diffused and complemented with customer education on the smart use of energy. Strong public-private partnerships are needed to accomplish these goals.

There is universal agreement among development banks, the United Nations, national governments, technology developers, electricity providers and non-governmental organizations that effective public-private partnerships are critical to the deployment of low-carbon electricity technologies. The public-private partnership model can be a superior instrument for delivering public services to ensure the investment climate is favorable and to allocate risk for the private sector. These partnerships are also critical to provide electricity to those who are not served or are underserved.

The e8, with its partnering organizations, conducted a survey of best practices by partnership promoters, practitioners and beneficiaries. The purpose was to identify which policy and project characteristics establish an attractive financial risk-reward atmosphere to bring projects to fruition. The results of that survey are presented in this report, and recommendations may be used by partnering organizations with countries to adopt best practices in their electricity technology deployment plans.

The survey questions were based on researched resources such as the Institute for Public-Private Partnerships, the World Bank, the United Nations (UN), World Business Council for Sustainable Development, the US Energy Association, World Energy Council, the Edison Electric Institute, UN Foundation and UN Fund for International Partnerships. The e8 worked with partner organizations to disseminate the survey to their staff, members and associates.

For the purpose of this effort, a public-private partnership can be defined as a specific arrangement between one (or more) public entities and one (or more) private entities to complete a given project.

Partnering organizations

The e8 and UN-Energy reached out to development and energy associations to request that their members complete the survey and share case studies on their experiences using public-private partnerships to bring projects to completion. Those organizations that were invited to complete the survey include:

African Development Bank
Asian Development Bank*
Association of Southeast Asian Nations
Edison Electric Institute
Electric Power Research Institute
Energy for ALL
Foundation for Environmental Education
Global Environment Facility
Global Village Energy Partnership
Independent Power Producers
Inter-American Development Bank
International Electricity Partnership
International Alliance for Rural Electrification
International Labor
International Electricity Partnership (IEP)
Pacific Power Association
R20*
Renewable Energy & Energy Efficiency Partnership (REEEP)
TERI (The Energy and Resources Institute)
United Nations*
United Nations Foundation*
UN Fund for International Partnerships*
U.S. Energy Association*
World Bank*
World Business Council for Sustainable Development*
World Energy Council*
World Energy Forum
World LP Gas Association

* Organizations invited to review the draft report

Goal

The goal of the survey and this report is to identify and recommend:

- The most effective and meaningful partnerships that support and promote the global deployment of low- and zero-emitting electricity technologies
- The best enabling public policies in an attractive financial risk-reward atmosphere created by public-private partnerships

Survey

The e8 conducted a global survey and analyzed case studies highlighting the enabling policies and best practices of public-private partnerships. The report of these results is an important element of the initiative as it aims to support countries in making significant progress toward global electricity access by 2030.

The survey was conducted from December 10, 2010 to February 20, 2011. While the total universe of survey recipients is unknown, the number of respondents completing the majority of survey questions is 78. Of those 78 respondents, 24 provided case studies. The case studies received at publication are appended to this report. The case study universe will continue to expand as additional case studies are collected and included on the case study website (www.e8.org/ppp).

Survey Respondents by Sector

Sectors	Number of Respondents
Technology manufacturer/vendor	6
Electricity provider	38
Electricity/energy association	5
Electricity technology research developer	3
Financial organization	5
Development agency or bank	4
Electricity sector regulator	3
United Nations office	1
Nongovernmental organization/civil society	8
Other	4

The breakdown of the respondents by sector is as follows:

- 67% industry sector
- 12% financial
- 5% public
- 15% other

Statistical weighting of the survey responses was not conducted based on the overwhelming number of respondents who are from the industrial/private sector. Therefore, this report primarily represents the private sector ratings as top partnership requirements to mitigate risk in advancing and deploying sustainable, low-carbon technologies. However, the perspectives of the other sectors (civil society and public) are included in the qualitative analysis and recommendations.

"Never doubt that a small group of thoughtful, committed people can change the world. Indeed it is the only thing that ever has".

— Margaret Mead – American Anthropologist

II.1 Policy Elements to Promote Low-Carbon Technologies and Energy Efficiency Measures

The establishment of a formal technology development plan, a strong legislative framework and a clearly defined public-private partnership strategy are critical policy elements to effectively promote sustainable electricity technologies. These technologies will in turn foster economic and social development and mitigate the financial risk for investors. Respondents agreed that the priority policy elements that help promote low-carbon technologies and energy efficiency measures were a clear framework of legislation and long-term regulatory clarity and certainty. A formal technology development plan should:

- Establish a long-term vision with realistic goals,
- Allow a mix of technologies that are compatible with local conditions and strong up-front assessment of costs and matching subsidies that would be required,
- Develop human capacity-building for long-term operation and maintenance,
- Minimize risks for private sector investment, and
- Allocate government resources.

A strong legislative framework is considered necessary to remove barriers, stimulate investment with appropriate incentives to meet electricity demand, establish fair and stable regulations, deploy an environmental policy for clean energy sources and provide special incentives and financing for new technologies. This approach of good governance and robust community involvement helps bring projects to a successful conclusion.

The private sector makes long-term financial investments, and these types of investments require stable, long-term policies and financial incentives. An environment conducive to investment and financial incentives was rated by over 75% of respondents as extremely or very important.

The priority of national energy policies should be to limit costs by providing efficient incentives to consumers and operators. A key condition for that outcome is to tailor public policies to the maturity level of technologies.

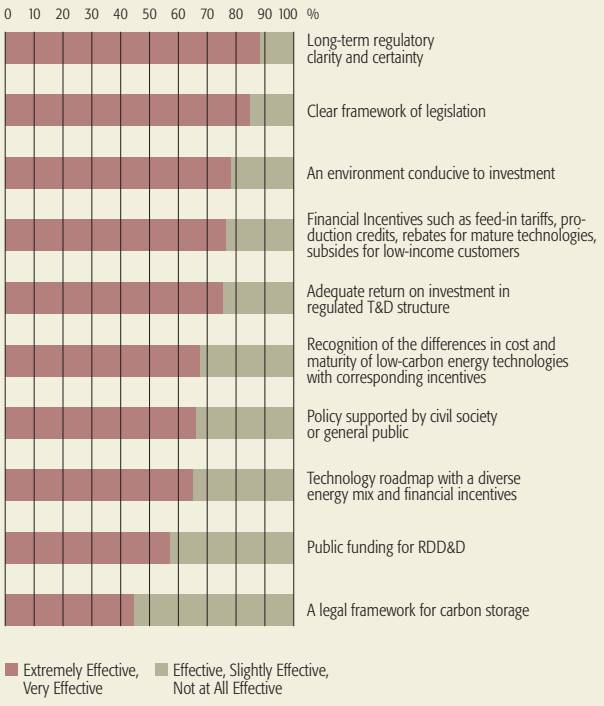
The private sector will shy away from areas with uncertain regulatory climates. If investments were made in countries with unstable governments, they would have a high probability of being lost.

Survey results regarding the policies surrounding carbon capture and storage (CCS) have trended to the slightly important to not important at all; this could be based on the coal resources of a particular country. If a country does not rely on coal for electricity production either from its own resources or through imports, this will not be an important issue for them.

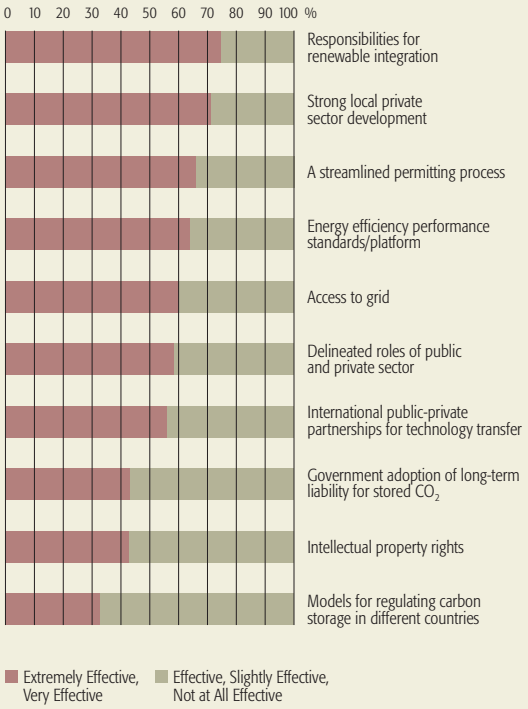
The report's findings underscore the need for the public sector to institutionalize enabling financial and other policies due to the very large and long-term investments that are required to deploy technologies at a scale that will provide significant benefits.

Recommendation: Establish a formal national energy development plan with a strong legislative framework and a clearly defined public-private partnership strategy. This will enable reconciling security of supply, climate change and economic growth. Sustainable electricity policies will foster economic and social development and mitigate the financial risk for investors. Establishment of these policy elements will remove barriers, stimulate investment, establish stable legal and regulatory frameworks and provide incentives and financing to bring clean electricity to unserved and underserved populations.

Policy elements that reduce risk to promote low-carbon technology and energy efficiency



Other policy elements that promote low-carbon technology and energy efficiency



Case Study – Hydro Tasmania – Australia
The Hydro Tasmania project demonstrates that continual policy refinement can occur for:

- The objectives of funding programs and different needs in the innovation cycle/stages of low-carbon projects
- The interaction of electricity supply/demand and feedstock costs and availability
- The interaction of markets
- Quality control standards
- Capacity building and service delivery

Policy frameworks, governance and transparency must exist. As lessons are learned, policies must be refined. (Pg. 21)

"We intend to conduct our business in a way that not only meets but exceeds the expectations of our customers, business partners, shareholders, and creditors, as well as the communities in which we operate and society at large".

— Akira Mori – President of the Mori Trust, Japan

II.2 Mechanisms to Establish Energy Policies That Promote Public-Private Partnerships

National energy plans, national legislation and regulation were favored over other means because they provide clear direction and assured cost recovery requirements. In addition, through the legislative and regulatory development process, stakeholders can actively participate. Private companies may sense they have more control and can somewhat mitigate their exposure to regulatory and financial risk through advocacy with legislators and policymakers. This is not the case at the international level as private companies and other NGOs rarely participate in the policy process.

For many countries, international treaties and regional agreements have been ineffective or they have opted not to sign the agreement.

Market-based mechanisms have been very successful in many countries, but carbon markets have failed to emerge in the United States. In recent years, there has become a mistrust of markets and fear of collapse. In addition, due to many governments' budget deficits, there is a lack of trust of government to use the money for new technology investments instead of debt coverage.

Other effective ways to establish energy policy as provided by the respondents include:

- Coordinated aid and multilateral programs/strategies
- Energy conservation education
- Energy integration & cooperation (regional and international)
- Financial mechanisms
- Initial investment support
- Tax on carbon; fuel surcharge on all energy consumption
- International consortium of various governments delineated by energy producers vs. energy consumers
- Persuasion via public relations, public affairs, advocacy, and lobbying

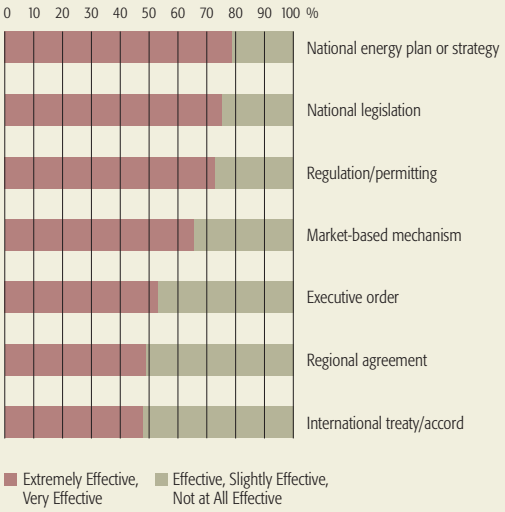
Vale dos Ventos Wind Power Complex, Mataraca City, Pernambuco State, Brazil

While there are benefits from international agreements among countries, it is understandable that the private sector is most interested in tangible and predictable arrangements at national and local levels. The UN supports the creation of energy development plans at the national level that are strongly supported by the public sector so the pathway and schedule for technology deployment are transparent. These plans need to be based on analytical assessments of resources that can generate and deliver reliable electricity and energy efficiency at affordable prices to support energy security, economic growth through industrial and commercial users, increased environmental improvements and social benefits for citizens.

Well-designed energy development plans are also essential to guide the distribution of financial resources through technology funds. These resources need to be allocated to effectively support needed low- and zero-emitting technologies, particularly renewables.

Recommendation: Provide assured cost recovery and profit potential for investors by creating national energy plans backed by legislation and regulation that establish a commitment to the promotion of low-carbon technologies.

Effective ways energy policies can be established



Case Study – Feasibility Study for CO_2 Capture for Enhanced Oil Recovery

The UN Framework Convention on Climate Change, the Kyoto Protocol and the establishment of the European Union Emissions Trading System (EU ETS) were the conditions that favored Enel's engagement in the CDM. Local policies were essential in assessing the additionality and feasibility of the projects (in some cases local laws were adopted to remove bureaucratic hurdles in the implementation of the CDM project). (Pg. 28)

"In this new wave of technology, you can't do it all yourself, you have to form alliances".

— Carlos Slim Helu – Mexican communications mogul considered the "richest man in the world"

II.3 Policy Options That Best Support Public-Private Partnerships in Research, Development, Demonstration and Deployment of Projects

The best ways public-private partnerships can support research, development, demonstration and deployment (RDD&D) of projects across a wide range of emerging clean electricity technologies is to provide a stable and effective source of funding. The utility industry still operates with the same basic technology from years ago. Utilities have traditionally purchased conventional technologies from well-known vendors; however, decarbonizing the current fleet and the addition of renewable technologies are not as straightforward. The current CO_2 control technologies can't simply be tacked onto the back of the plant like other pollution control technologies. They have to be integrated, made more efficient, and modified to determine optimal performance. Some are still at the bench-scale level. Likewise, renewable and storage technologies are still developing and have far to come to be cost competitive with conventional technologies. Advancing these technologies can only be done through RDD&D but the demonstration stage can be expensive. The utility industry is often not structured to recover costs for large-scale RDD&D without legal and regulatory support. Public-private partnerships will have to change the way RDD&D is funded if they are to lead the way to decarbonization of the electricity generation fleet.

Policies should be tailored to the maturity level of technologies:

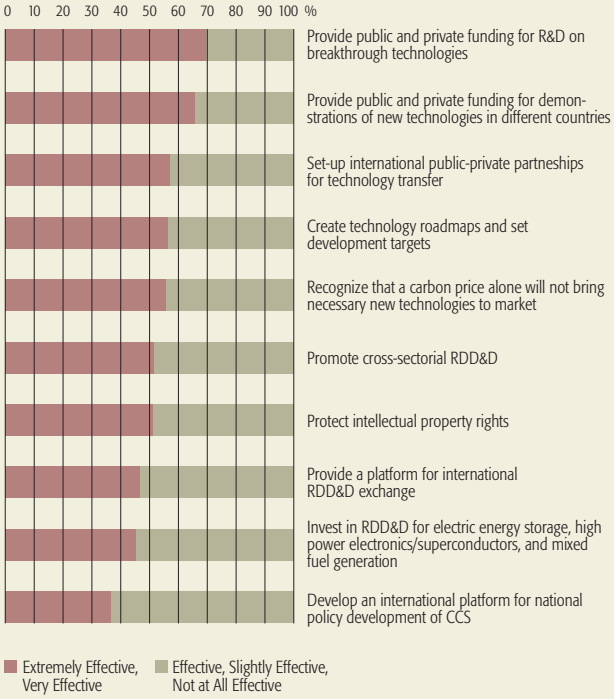
- For technologies still very far away from commercial maturity, innovation and technology breakthroughs should be stimulated, such as through public co-financing of RDD&D efforts.
- For technologies very close to commercial maturity, public intervention can concentrate on progressive transition toward a competitive market, such as through a price on carbon, or a progressive shifting of technology remuneration schemes away from pure subsidies toward the level playing field of the market.

The development of international policy for carbon capture and storage was not considered as important as other policies by respondents. This could possibly be due to the country's energy resources (i.e., if a country does not have coal resources, it does not need policies supporting CO_2 storage).

There is a need for applied research to improve the efficiency and reduce the costs of electricity from generating, transmitting and end use energy efficiency technologies that are low-and zero-emitting. For example, wind turbine technology development and deployment has been focused on larger and larger units in centralized groups to capture economies of scale in high quality wind resources. But these turbines in low quality wind regimes would not be economical as they would generate power at extremely high costs. Smaller turbines matched to these conditions would be economical and increase the use of this technology.

Recommendation: Provide stable, sufficient funding for research, development, demonstration and deployment (RDD&D) of a wide range of emerging clean electricity technologies. RDD&D is very expensive. Public-private partnerships will have to change the way RDD&D is financed in order to lead the way to decarbonization of the electricity supply.

Defining effective public-private partnerships



Case Study – Midwest Regional Carbon Sequestration Partnership (MRCSP)

This research project could not have been done except as a public-private partnership because it is so expensive and technically challenging. The partnership mitigates the risks for all involved. (Pg. 51)

"If we are going to carry on growing, and we will, because no country is going to forfeit its right to economic growth, we have to find a way of doing it sustainably".

— Tony Blair – former British Prime Minister

II.4 Regulator Perspective of Key Policies

The respondents who identified themselves as regulators were asked to provide the key policies needed for stimulating public-private partnerships for promoting low-carbon technologies and infrastructure expansion. The key policies highlighted by respondents included:

- Human capacity-building for public officials involved in designing and negotiating public private partnerships as it requires a high level of expertise that is often not developed, especially in countries where energy poverty is a major issue.
- Legal frameworks must be adapted to facilitate investment.
- Regulatory frameworks that allow long-term contracts to be awarded through bids with prices defined along the contract period.

Country-level financial and environmental regulations should be tied very closely to implementing national energy development plans. The most effective regulations would be focused on incentives that would be flexible; optimize technology capabilities for affordable, reliable, clean electricity; and create positive risk-reward conditions.

It is less helpful for regulations to be restrictive, e.g., selective for a few technologies, deployment timing, costs, or to be unclear about environmental requirements and other factors.

"As we go forward, I hope we're going to continue to use technology to make really big differences in how people live and work".

— Sergey Brin – Russian-born Google founder

III.1 Benefits of Strong Public-Private Partnerships for Electricity Technology Deployment

There is no such thing as a "bad" benefit, so when reviewing the responses one must consider those that ranked highest as being the top priorities. In this case, the ability to improve access to electricity and stimulate local economic and social development was considered to be extremely or very important by about 80 percent of the respondents. Increasing access to electricity allows new business to come into areas that were previously deemed unsuitable. As new businesses expand into these areas, they bring more jobs. Newly electrified communities will have access to additional health care, clean water and education, thus allowing them to develop economically and socially. These additions raise the standard of living for the local population and improve environmental quality – considered extremely and very important by nearly three-quarters of the respondents. In this regard, human capacity-building is key to fostering the emergence of local industries and entrepreneurship that can flourish through access to energy.

While fueling business productivity and expansion was ranked the lowest of all the possible responses, well over half of the respondents still considered it to be extremely and very important.

Other benefits of strong partnerships as stated by respondents include:

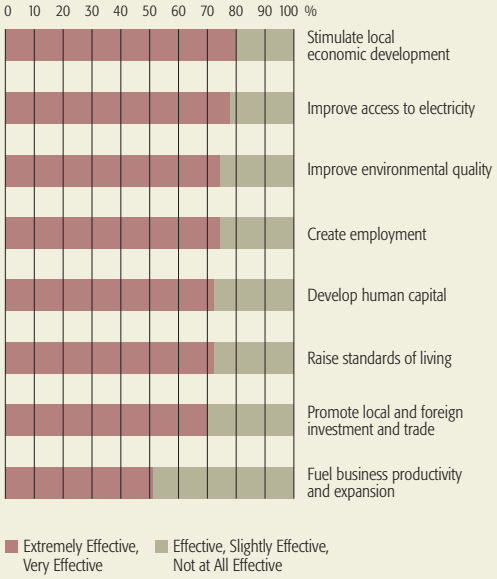
- Improve education, training and all-around performance
- Accelerate innovation and technology diffusion
- Facilitate a profitable project environment
- Provide project funding/certainty to reduce risk
- Facilitate navigation of the multilateral/bureaucratic processes to reduce risk and enhance financial viability
- Provide affordable energy and clean energy technologies

The challenge for public, private and civil society sector members in each country will be to use partnerships to maximize all of the benefits.

Increasing private sector participation in technology diffusion activities – such as in an advisory role in government and technology fund allocation and distribution decision making would contribute to enhancing energy development programs.

Recommendation: Maximize benefits brought to communities from new and expanded electrification. These public-private partnerships will raise the standard of living for recipients and support communities in their economic and social development through improved access to electricity.

Benefits of public-private partnerships for electric technology advancement



Case Study – Ifugao-Ambangal Mini-hydro Project – Philippines
The project developed a 200kW mini-hydro power plant and established a conservation fund to be financed by power sale revenues generated from the plant. This is an excellent example of a way to develop regional and rural electrification to stimulate economic growth and improve living standards while maintaining a worldwide recognized cultural heritage site. (Pg. 44)

"If you would know the value of money, go and try to borrow some".

— Benjamin Franklin – US printer, scientist, inventor, statesman, diplomat

III.2 Private Sector Contributions to Strong Partnerships

When considering the contribution of the private sector to partnerships, respondents overwhelmingly regarded the private sector's ability to bring financial resources as key. Over 95 percent of respondents agreed that access to private capital was how the private sector can contribute most effectively in the partnership, with 65 percent strongly agreeing. This demonstrates that there is a strong need for private sector involvement in electricity technology deployment.

Two-thirds of the respondents regarded the managerial experience, ability to successfully design and implement a project with the effective use of resources as an important contribution of the private sector.

It also should be noted that almost one-third of these private sector respondents were ambivalent to access to new markets. This could be due to recent economic conditions and the fact that most companies have refocused on core business rather than expansion. In addition, this could be a result of wariness of going into areas of uncertain regulatory climates or government instability, especially in developing countries.

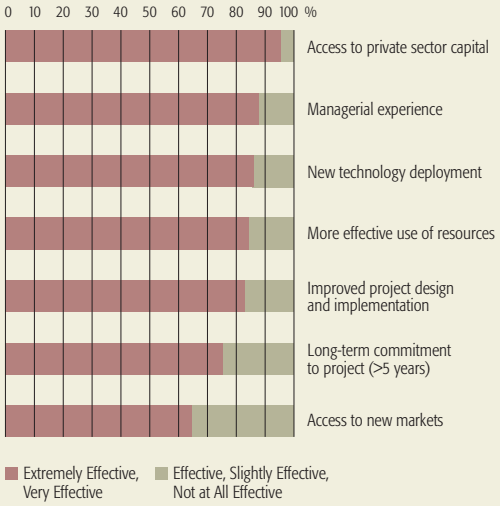
Other private sector contributions noted by respondents include:
- Risk management
- Coordination of financing sources (channeling of international financial sources)
- Non-asset based lending practices (i.e., projected revenue streams)
- Alternative global funding resources (i.e., hedge funds, private equity, initial public offerings)
- Public relations and marketing skills to help change perceptions of new technologies
- Networks of entrepreneurs/business people to stimulate innovation and competition from other firms
- Technology innovation and the introduction of new technologies
- Technology and skill transfer

The private sector is very qualified to lead the development of projects with the financing and project management skills it possesses. It will be important for the private sector to regularly communicate progress and challenges with the public sector and civil society and to build knowledge capacity in countries. For example, the UN and e8 have embarked on an initiative to build capacity for energy practitioners, including ministry officials, utility representatives, energy providers, technology vendors, and financial institutions through a series of financing electrification workshops.

e8 and UN Financing Sustainable Electrification Dialogues
Transfer of institutional expertise and business-oriented know-how for the financing of sustainable electrification projects and the deployment of low-emitting power technologies in developing and emerging countries.

Recommendation: Optimize the private sector's ability to bring many financing alternatives for electricity projects and to design, construct, operate and maintain them. Over 95 percent of respondents agreed that the private sector's most effective contribution to a public-private partnership was in the provision of capital.

Level of agreement with potential ways the private sector can contibute to the strongest partnerships for electricity technology deployment



Case Study – Surabaya Food Waste to Energy Facility – Indonesia
The partnership employed project financing (equity/debt ratio of 30/70). The public entity provided the land. The private partner provided the equity, technology and debt from multilaterals like the Asian Development Bank and commercial banks. (Pg. 37)

"At the end of the day, government is about teamwork and partnership, and we will be proving that by working together".

– Julia Gillard – Prime Minister of Australia

III.3 Public Sector Contributions to Strong Partnerships

One of the key strengths that the public sector can bring to the table in any partnership is the ability to develop long-term, low-risk policies that can entice financial contributors and project developers to invest in projects. The survey responses reinforce this by strongly agreeing that the public sector's strongest contribution is to create a low-risk, predictable and enabling political, legal and regulatory environment and establish electricity development goals and timetables with a long-term technology deployment program.

In addition, the public sector can bring financial resources to the project in the form of tariffs that may cover return on investments and special incentives for new low-carbon technologies.

When considering project design, construction, operation and maintenance, over one-third of the respondents did not agree that this was the role of the government and is probably best left to the private sector.

Other contributions from the public sector noted by the respondents include:

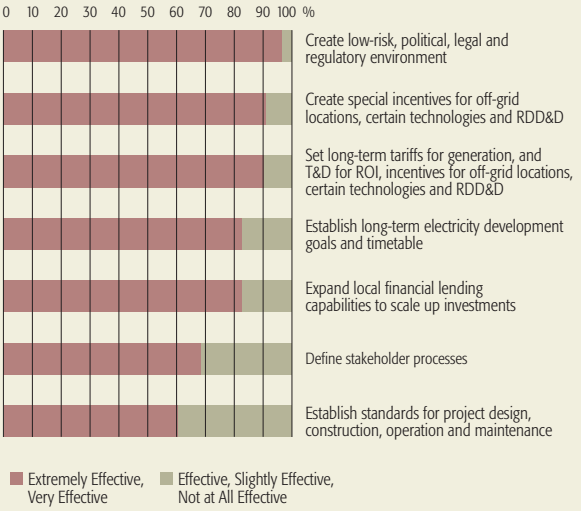
- Identify the areas of public interest that are not met, then create public policies to address those public needs
- Coordinate activities of the various levels of government to ensure that they are issuing coherent signals and incentives
- Streamline regulatory and environmental approvals
- Educate the public on the need for and benefits of the partnership
- Put off-grid development on a level playing field with grid extension
- Consider subsidies as a key to sustainable engagement of the private sector and to an effective public-private partnership
- Establish low interest loans and project financing
- Set up proper institutions and initiate appropriate institutional reforms for the energy sector and the economy

To simultaneously achieve the goals of universal access and energy efficiency at the scale and speed required, the public sector will need to recognized the valuable role and experience of the private sector.

These conditions should be cooperatively established among private, public and civil society sector members in countries. Continuous communication among the sectors will keep technology deployment on schedule.

Recommendation: Set electricity development goals and timetables for long-term technology deployment program under national energy plans. One of the key strengths of the public sector is the ability to develop long-term, low-risk policies that can entice financial contributors and project developers to invest in a project.

Contributions by the public sector to strengthen partnerships



Case Study – Wind PROINFA – Brazil
Establishing rules to mitigate risk was the primary contribution of the public entities involved in the wind project. Assuring the cash flow of the PPA is another key factor for public-private partnership success. (Pg. 22)

"If we are together, nothing is impossible. If we are divided, all will fail".

– Winston Churchill – former Prime Minister of Great Britain

III.4 Factors Contributing the Most to Ineffective Partnerships

When partnerships fail, everyone suffers. Respondents were asked to provide their own views on what caused partnerships to fail. The responses can be grouped into four basic categories: policies, partnerships, projects and other.

Policies

The lack of long-term, stable and predictable supporting policies and formal energy technology development plans can significantly contribute to ineffective partnerships. Energy policies and technology development plans are needed to lower the investment risk for the private sector and deliver the outcomes that link to the needs of the local communities.

When the host country government appears to be unstable, project developers and financial institutions do not want to invest large sums of capital, fearing that investment could be lost due to change in political leadership or shifting policies. In the case of highly bureaucratic governments, strong in-country expertise is needed to navigate a path forward.

The recurring themes of these policy-based responses include:

- Lack of legal framework, strategy, policy, goals, long-term plan, etc.
- Political uncertainty, changing government policies
- Bureaucracy

Partnerships

Partnerships are like marriages; no matter how great they appear on the surface, there is always room for improvement. Despite best intentions or the highly important nature of the project, if the partnership fails, the project fails. Respondents ranked the following partnership characteristics as most damaging:

- Lack of communication
- Undefined roles and responsibilities
- Lack of mutual respect
- Wrong partner
- Lack of commitment, cooperation, accountability
- Corruption

Projects
The purpose of the public-private partnership is to develop low-carbon-emitting electricity projects. When the partnership is unable to establish a clear set of goals to provide a favorable environment for the development of new technologies, it has failed. Both sides must establish realistic expectations and address all issues that arise during project development. The responses that illustrated the failure due to poor project development include:
- Poorly defined project or objectives
- Lack of funding
- Lack of capacity building

Other
The public must be convinced that the partnership is in its best interest. The partnership must be prepared to educate the public and, in turn, persuade them that it serves the overall public good. If the public is not convinced or misunderstands the purpose of the partnership, it could lobby its political representatives and succeed in thwarting the partnership. All invested funds would then be lost. It is important to involve the public from the beginning, acknowledging that their approval is critical for success.

The project culminating from the public-private partnership must demonstrate genuine creation and quantification of added value for the host country's local community, such as job creation, greenhouse gas emission reduction, investments resulting in technology transfer, etc. Without the clear demonstration of the added value of the project, the partnership could be considered a failure.

Recommendation:
Sustain strong partnerships with effective communication, well-defined roles and responsibilities, and continuous commitment.

Case Study – Wiwili Mini-Hydro – Nicaragua
The role of a public-private partnership is yet to be proven. A more thorough definition of the roles and responsibilities as well as the long-term commitment of all stakeholders must be agreed upon prior to implementation. (Pg. 43)

"My wheels are running. My investments are local, region and international".

— Prince Alwaleed Bin Talal Alsaud – investor and entrepreneur, Saudi Arabia

IV.1 Financing for Promoting and Deploying Efficient, Low-Carbon Technologies and Infrastructure Expansion

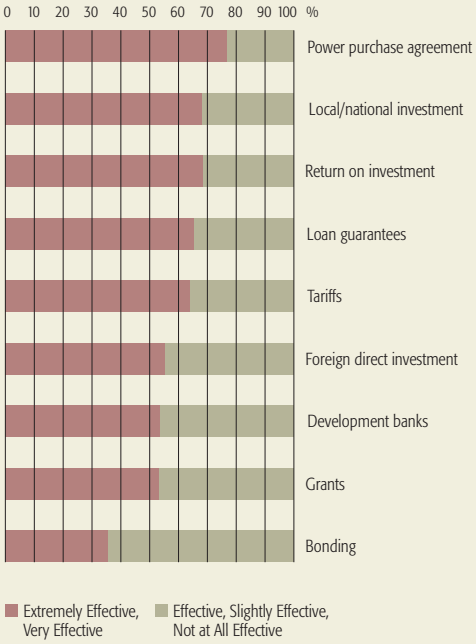
The use of power purchase agreements (PPAs) by the private sector has historically allowed for greater certainty for long-term investments. Over three-quarters of respondents stated that the use of PPAs is extremely to very effective in securing financing to deploy low-carbon technologies. While the use of bonding, grants and subsidies can lower costs, it cannot offer the same level of security as guaranteed, long-term income for a project.

The use of development banks was ranked extremely effective by 40 percent of respondents, which can be provided as access to capital through grants or low-interest loans for developing countries. In addition to providing grants or concessional funds to sovereign entities (governments), development banks can also provide guarantees and equity investment to the private sector or public-private special purpose vehicles. Moreover, development banks offer longer tenure loans than are available in many developing countries and can provide loans in local or foreign currency. Investment from a development bank can be crucial to bring in other investors.

Bonding is not widely used and therefore was not considered as effective as other means.

Other types of financing the respondents indicated were effecting for promoting these technologies include:
- Specialized securitized financial products for global investors (i.e., sell shares of an international member-based consortium)
- Specialized venture capital/hedge fund financing for applicable projects or segments thereof
- Vendor financing through international export banks and their manufacturing clients
- Funds from emissions trading, carbon credits, carbon funds
- Concessional/soft loans (provided to poorest countries with lower interest rates and longer repayment periods than typical or standard market or multilateral loans)
- Climate Investment Funds
- Taxes (including tax credits) and/or import duties on some technologies/parts

Effectiveness at promoting low-carbon technologies, infrastructure expansion (transmission, distribution, storage) and the deployment of efficient technologies



When considering the responses of those surveyed that identified themselves as being from financial institutions, the importance of power purchase agreements is emphasized again demonstrating the importance of mitigating risk through long-term, secure income. In addition, loan guarantees—another way to minimize risk—were considered extremely to very effective by two-thirds of financiers as a way of securing financing to deploy low-carbon projects.

It is understandable that guaranteed long-term income streams are most important to the private sector and that the power purchase agreement is the most secure and preferred instrument for that purpose. The public sector needs to be positioned through means such as multilateral development banks and other financial institutions to assure that timely payments under these agreements will be made.

Recommendation: Use power purchase agreements with the private sector for greatest certainty regarding long-term investments. Over three-quarters of respondents stated that the use of PPAs is extremely to very effective in securing financing to deploy low-carbon technologies. The responses of those surveyed from financial institutions reinforced the importance of mitigating financial risk through long-term, secure income streams.

Case Study – SPP Esmeralda – Brazil
Existing policies provided assurance that the hydro project could obtain long-term Purchased Power Agreements (PPA) within the scope of PROINFA, that financing would be provided by the social economic development bank, and that incentives and guarantees for investors would be available. These policies positively affected the decision to proceed with the project. (Pg. 23)

"Nobody spends somebody else's money as carefully as he spends his own. Nobody uses somebody else's resources as carefully as he uses his own. So if you want efficiency and effectiveness, if you want knowledge to be properly utilized, you have to do it through the means of private property".

— Milton Friedman – US Nobel Prize-winning economist

IV.2 Role of Public-Private Partnerships in Securing Proper Financing

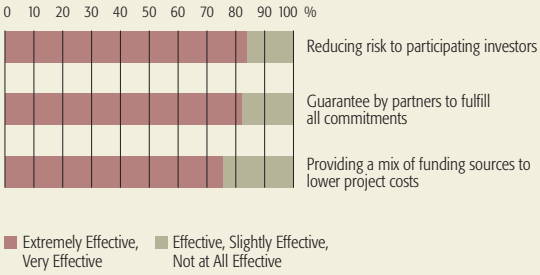
The primary role of public-private partnership for securing financing is to mitigate the risk of the investment to make it attractive for all participants. All industry sectors indicated that a guarantee by partners to fulfill all commitments is the most important aspect to establish the funding required to bring projects forward. This was further emphasized by the financial sector's response.

Other roles the respondents indicated that public-private partnerships perform include:

- Bringing expertise and capital, but also leveraging scarce resources, reducing risks and creating ownership by governments
- Reducing risk of loss/damage of concession agreement facilities (e.g., by insurance)
- Creating a special company where the private, public and financial sectors are equity stakeholders and establishing a board of directors
- Establishing transparent and enlightened procedures for operation
- Creating general confidence for stakeholders (including services providers, technology manufac-

turers and consumers) that projects can be successfully and cost effectively achieved in a transparent manner
- Simplifying the procedures for financing

Importance of the roll public-private partnerships in ensuring the proper financing is secured



Case Study – Solar Project at Soccer Stadium – Brazil

In this partnership Coelba, the State of Bahia and the German Society for International Cooperation (GIZ) were responsible for financing different aspects of the project:
- Coelba: energy efficiency capital, project development, and system acquisition and installation
- Bahia: reinforcement of the stadium's infrastructure
- GIZ: consulting and traveling expenses (Pg. 24)

"I have found no greater satisfaction than achieving success through honest dealing and strict adherence to the view that, for you to gain, those you deal with should gain as well".

— Alan Greenspan – Former Chairman of the Board of Governors of the United States Federal Reserve System

IV.3 Policies Required by the Private Sector for Financing of Infrastructure Expansion and Deployment of Low-Carbon Technologies

The respondents who identified themselves as electricity providers were asked to provide the key policies needed for financing low-carbon technologies and infrastructure expansion. Promotion of low-carbon technologies for unserved and underserved populations requires a high degree of external cooperation, since it is very hard for the final beneficiaries to support high financial burdens through real cost tariffs; subsidies are needed.

The key policies that were recommended by electricity providers include:
- Government should create reliable environment to encourage private-sector involvement
- Stable legal policy framework; national energy policy
- Funding mechanisms: return on investment guarantees, tax credits, long-term power purchase agreements, soft/concessional loans, carbon markets, etc.
- Tariffs and subsidies (grants, donations)
- Policy for human capacity building (i.e., professional development, focusing on professional education and training)
- Research, development and deployment funding
- Foreign investment, bilateral agreements between countries

The Member States of the United Nations have or are developing these policies. But to achieve the goals, the policies could be reviewed and be improved as needed to be more effective. This assessment and changes should be collaboratively made with existing knowledge-sharing networks enhanced with private sector partners.

Case Study – Five Nations Transmission Project – Canada

The provincial government recognized its obligations to First Nations communities and found ways within current policy under which it could address at least some opportunities to better the lives of citizens in those communities. The partnership largely involved assistance in financing. (Pg. 26)

"I don't want to be left behind. In fact, I want to be here before the action starts".

— Kerry Packer – Australian media magnate

V. Moving Forward

The International Energy Agency estimates that 1.4 billion people will still lack access to electricity in 2030. Successfully tackling electrification for on- and off-grid areas means to adapt programs and technologies to the local environments. The e8 (under our new name, Global Sustainable Electricity Partnership) together with UN-Energy and other partners can assist utilities in developing countries to pursue various public and private avenues for sustainable, universal electrification. In addition, we will support participating organizations and developing countries interested in implementing the recommendations found in this report.

The e8's proven experience collaborating with public and private institutions (e.g., World Bank, International Electricity Association, Asian Development Bank, UN) to develop low-carbon electricity projects and our ability to successfully design and implement a project and effectively expend resources will allow us to share this industry's experience with organizations attempting to bring electricity to those who are unserved or underserved.

A number of general issues have emerged from this survey that require further discussion between the public and private sector:

- The immense global challenge of giving people in the developing countries access to affordable, clean and safe electricity generated, transmitted and distributed in a sustainable way, either by means of larger-scale power grids or isolated mini- or micro-grids, needs improved coordination among the public and private sectors.
- Capital investments must be linked closely to committing resources and building capacities to maintain facilities over the long-term. Efforts need to be increased related to human capacity building, establishment of sound policy frameworks, and good governance.
- Governments of beneficiary countries must create a favorable business and regulatory environment and adopt transparent decision-making mechanisms.
- Ensuring financial and economic viability is of paramount importance or projects will not be sustainable over the long-term.
- Innovations in technology, business models and financing are necessary to offer tailor-made solutions.

These actions and the recommendations are appropriate and necessary to achieve the goals. The public sector should be ready to work in concert with private and civil society sectors to strengthen partnerships as outlined in this report.

The following actions are required to ensure that the recommendations identified in this report continue into the future.

Action 1: Establish and maintain strong public-private partnerships to accelerate global clean electricity technology deployment

Demand for electricity is projected to increase significantly, with the greatest increases occurring in developing countries. Unless adequate policies and appropriate instruments are established to facilitate investments in clean energy technologies, project developers and financial institutions will be unwilling to invest in these countries.

Action 2: Attract private investment

The private sector's resources even if supplemented by public resources are far from adequate to meet the large investment requirements of providing sustainable electricity to all. However, mobilizing capital from public and private sources is vital for developing countries. Investors need to be provided with risk-adjusted returns on their investments, making them comparable to returns from advanced countries.

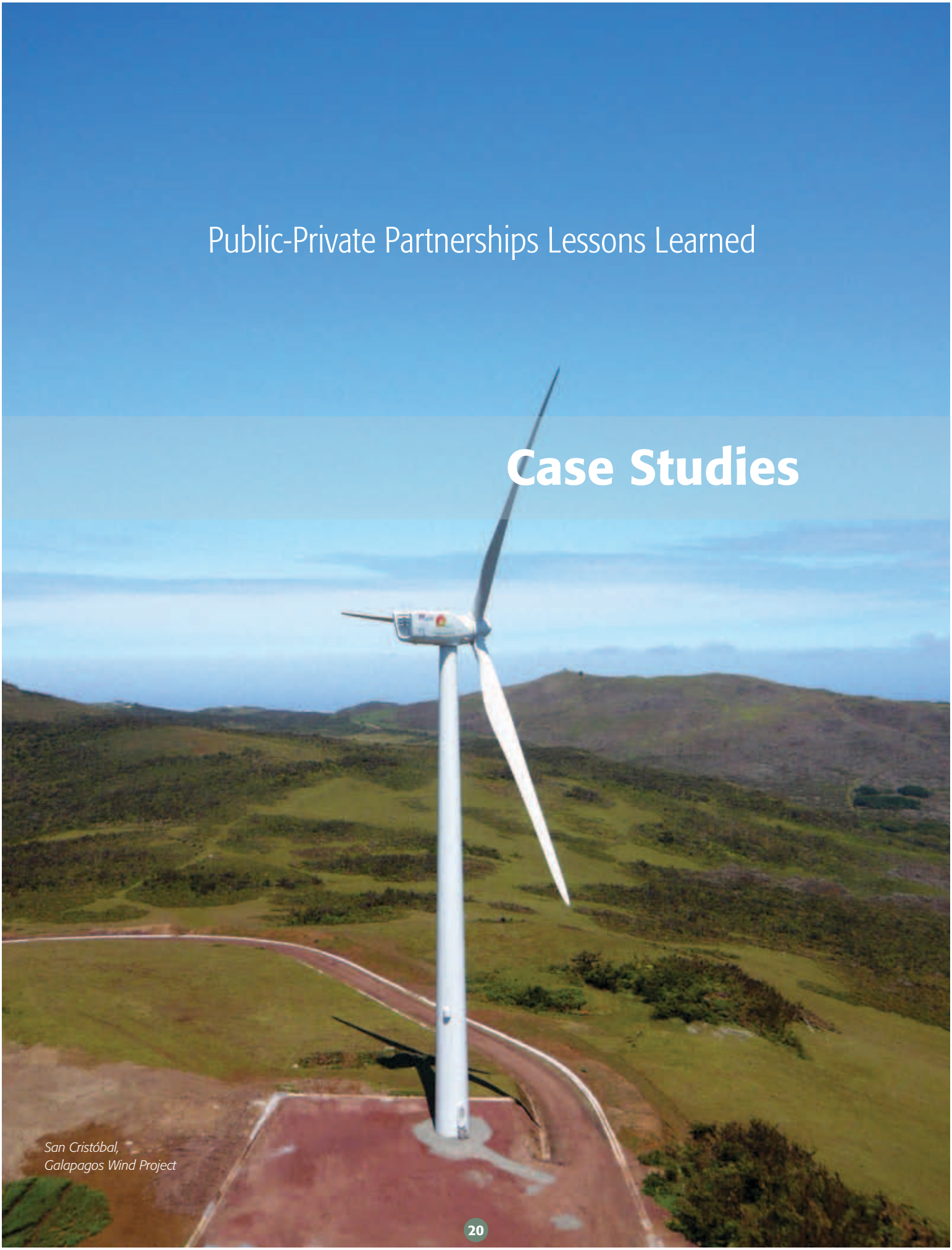
Action 3: Develop human resources

Necessary conditions for successfully planning, implementing and managing the operation and maintenance of energy projects are the required capacities and human resources available locally and regionally. Weak capacities and a lack of means to sustain them are key reasons for project failures. Public-private partnerships should contain human capacity building programs adjusted to the needs of the countries and local community.

Recommendation: Implement these recommendations by increasing the alignment of public, private and civil society sector practitioner efforts with willing countries.

Public-Private Partnerships Lessons Learned

Case Studies



San Cristóbal,
Galapagos Wind Project

Australia

Lessons Learned Case Study

The Project
- This is a portfolio of innovative new and existing renewable energy technologies targeted at reducing diesel consumption for power supply.
- Technologies employed include solar, concentrated solar, thermal and chemical energy storage, diesel, wind, hydro, solar thermal, biofuels, biomass, battery lighting systems, hydropower and water storage and transfer.
- This is a globally unique opportunity to demonstrate the integration of a portfolio of renewable generation with enabling and smart grid technologies.

Public-Private Participants

Public Sector:
- Australian Government Renewable Energy Deployment Program (REDP), State government community obligation agreement

Private Sector:
- Joint venture combining Hydro Tasmania and private equity

LESSONS LEARNED

Energy Policies
- The design criteria were created to match the Australian Reconciliation Action Plan (RAP) program. RAP is a tool to help organisations build positive relationships between indigenous and non-indigenous people and to improve the life expectancy of indigenous people.
- Because the application for funding met the requirement of the RAP, funding was able to be obtained.
- No new energy policies have been created to facilitate the project.

Financing
- The project would not have proceeded without the grants and associated arrangements.

Replicability
- Replication potential exists for both off-grid and grid-connected situations where an increase in renewable penetration is desired. Specific components for replicability include:

- Capacity Development
  - Data collection & analysis
  - Utility planning & forecasting
  - Renewable energy training
  - Project design
  - Technical capacity
  - Information for decision makers
  - Policy development
- Resource assessments
  - Renewable resources
  - Rural electrification and demand-side management
  - Power systems and controls

Long-Term Policy Framework
- This project demonstrates that continual policy refinement can occur for:
  - The objectives of funding programs and different needs in the innovation cycle/stages of different renewable energy projects
  - The interaction of electricity supply/demand and feedstock costs and availability
  - The interaction of markets
  - Quality control standards
  - Capacity building and service delivery

Research and Development
- The public sector can provide unique opportunities to apply pre-commercial intellectual property in full-scale demonstrations. They can also provide sufficiently long-term public purchase agreements, connection agreements and site licenses.
- The private sector brings innovation and capital project delivery. They also own the long-term commercial and delivery of products/solutions.

Conclusions
- The private sector can bring innovation, research and development and the expertise to design and implement projects.
- The public sector can provide the opportunity for projects to be initiated even when they may not be commercially viable.
- Policy frameworks, governance and transparency must exist. As lessons are learned, policies must be refined.
- The public sector can provide assistance in navigating bureaucracies and governmental processes.

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Brazil

Lessons Learned Case Study

The Project
- Wind power complexes fostered by Brazilian National Social and Economic Development Bank (BNDES) financing and by assured Purchased Power Agreements (PPA) from Eletrobrás.

Public-Private Participants

Public Sector:
- Eletrobrás – A major Brazilian power utility, it's also Latin America's biggest power utility company, tenth largest in the world and also the fourth-largest clean energy company in the world. The Brazilian federal government owns 52% of the stock of Eletrobrás.
- ANEEL (Brazilian Electricity Regulatory Agency)
- Energy Research Enterprise (EPE)

Private Sector:
- Companies that participated in the bidding process

LESSONS LEARNED

Energy Policies
- Establishing a legal framework to mitigate PPA risks is essential. For wind projects, specific rules and mechanisms exist that mitigate risks associated with setting the price of electricity in the bidding processes.

Financing
- The main guarantee for project financing was the PPA.
- The public entity provided financial assurance through the PPA for the period necessary to finance the project.
- The regulatory agency provided a framework that guaranties stable and predictable cash flow from the PPAs.
- Energy purchase guarantees were provided under the Brazilian Government's PROINFA (Programme of Incentives for Alternative Energy Sources) incentive program. PROINFA, administered by the national power utility Eletrobrás, encourages the development of renewables (wind, biomass and small hydroelectric plants) by offering long-term contracts for the electricity generated.

Replicability
- This project is replicable, specifically the bidding process structure and PPA design to mitigate risk.

Long-Term Policy Framework
- Public/private partnerships can influence the framework for long-term policy.
- It is important that public entities maintain or increase fiscal incentives when necessary to ensure the viability and durability of the policy framework in the long run.
- Maintaining a stable set of rules is also important.

Research and Development

The wind power project had no R&D aspects.

Conclusions

Setting rules to mitigate risk was the primary contribution of the public entities involved in the project. Assuring the cash flow of the PPA is another key factor for public-private partnership success.

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Brazil

Lessons Learned Case Study

The Project
- SPP Esmeralda – A small hydro power plant (22.2 MW), selling energy for the PROINFA (Programme of Incentives for Alternative Electricity Sources) Program, designed to incentivize alternative energy sources. The plant has been partially financed by BNDES.

Public-Private Participants

Public Sector:
- BNDES (Banco Nacional de Desenvolvimento Economico Social – Social-economic development bank), Eletrobrás

Private Sector:
- Engevix Engenharia S/A, an engineering consulting firm.

LESSONS LEARNED

Energy Policies
- Existing policies provided assurance that the project could obtain long-term Purchased Power Agreements (PPA) within the scope of PROINFA, that financing would be provided by BNDES, and that incentives and guarantees for investors would be available. These policies positively affected the decision to proceed with the project.

Financing
- Engevix Equity: about 30%
- BNDES Funding: about 70%
- Competitive prices and a 20-year term under a PPA.
- PPA: Eletrobrás (through incentive program PROINFA). PROINFA, administered by the national power utility Eletrobrás, encourages the development of renewables (wind, biomass and small hydroelectric plants) by offering long-term contracts for the electricity generated.

Long-term Policy Framework
- The private sector can contribute, with their experiences, to sectoral policies that provide for the development and application of new, more efficient technologies with lower carbon output.
- Public participants provide a stable, transparent regulatory framework that allows for societal participation.

Research and Development
- The private sector must have the financial capacity in order to invest in R&D and demonstrate renewable energy technologies. The public sector can contribute financial and fiscal incentives, provide material and human resources and public infrastructure and develop close relationships with similar companies in other countries.

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Brazil

Lessons Learned Case Study

The Project
Solar Photovoltaic Generation Project at Governador Professor Roberto Santos Soccer Stadium – City of Salvador, State of Bahia – Brazil.
- A solar photovoltaic generator with approximate power of 400 kW (peak) will be installed to the facility's rooftop and connected to the state of Bahia's power grid.
- For the Brazilian energy sector this project may represent not only great scientific and technological value, but also economic and social interests. Solar photovoltaic generation should, in the near future, be readily integrated into the energy matrix.

Public-Private Participants
Public Sector:
- Eletrobrás
- Government of the State of Bahia
- Universidade Federal de Santa Catarina – UFSC (Federal University of Santa Catarina)

Private Sector:
- Coelba/Neoenergia
- GIZ – German Society for International Cooperation
- Instituto Ideal

LESSONS LEARNED

Financing
- In this partnership Coelba, the State of Bahia and GTZ are responsible for financing, according to the following scheme:
- Coelba (66%) – R$ 3.683.717,83
- Estado da Bahia (32%) – R$ 1.753.792,87
- GIZ (2%) – R$ 120.000,00
- Total investment – R$ 5.557.510,70
- Coelba will invest its energy efficiency capital, regulated by Aneel, toward project development, as well as system acquisition and installation.
- The Government of Bahia will invest in reinforcement of the stadium's infrastructure in accordance with Decree 7.319, which stipulates special forms of taxation to support construction, expansion, renovation or upgrading of football stadiums with intended use in official matches of the 2013 FIFA Confederations Cup and the 2014 FIFA World Cup.
- GIZ will pay for consulting and traveling expenses.

Replicability
- The application of photovoltaic systems directly connected to the power grid is not yet fully developed in Brazil and offers opportunities for replication.
- The partnership has carefully acquired technical expertise on solar energy; knowledge that can be applied in future projects.

Long-Term Policy Framework
- Given what we've have learned from the successes/ challenges of the public-private partnership in the project, we believe that such partnerships can influence long-term policy development, for regulation of the integration of energy into the power grid.
- Private participants have a role in the development of new technologies, processes and methodology that may be applied effectively.
- Public participants must push for the development of well-defined regulations focused on the integration of energy into the power grid.

Research and Development
- Public-private partnerships provide practical and theoretical subsidies, as well as offering a practical case for the development of new studies on solar photovoltaic energy applications connected directly into the power grid.
- The private sector must evaluate the applicability of similar systems in the grid, as well as any needed adaptation.
- The public sector must evaluate incentives that may stimulate the development of such projects.

Conclusions
- The established partnership aims to maximize the distributed generation benefits of solar photovoltaic systems integrated into buildings in urban environments and near the consumer.
- Due to the stadium's high public profile, the project will help raise public awareness of the necessity of expanding the energy supply from renewable sources.
- In this sense, this project strengthens the bonds between the private and public partners, leaving the possibility for the development of new projects in the State of Bahia.

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Brazil

Lessons Learned Case Study

The Project
- PCH Figueirópolis is a 20-MW small hydroelectric plant.
- PCH Ludesa is a 30-MW small hydroelectric plant.

Public-Private Participants

Public Sector: Eletrobrás
- A major Brazilian electric utility; Latin America's largest electric utility company; tenth largest in the world and also the fourth-largest clean energy company in the world.
- The Brazilian federal government owns 52% of the stock of Eletrobrás.

Private Sector:
- Companhia Hidroelétria Figueirópolis S.A.
- Ludesa Energética S.A.

LESSONS LEARNED

Energy Policies
- Energy policies strongly affect the project decision-making because they can have a significant impact on the project's Internal Rate of Return (IRR).
- No new energy policies were established to facilitate the project.

Financing
- The project partners used a long-term financing approach with the Development Bank. Specifically in the Figueirópolis project, the partners utilized Banco do Brasil by means of the Mid-West Constitutional Financing Fund, or Fundo Constitucional de Financiamento do Centro-Oeste (FCO). FCO is an important instrument used to assist businesses within the midwest region of the country in generating social and economic development.
- The Public-Private Partners provided the financing entity with energy purchase guarantees under the Brazilian Government's PROINFA (Programme of Incentives for Alternative Energy Sources) incentive program. PROINFA, administered by the national power utility Eletrobrás, encourages the development of renewables (wind, biomass and small hydroelectric plants) by offering long-term contracts for the electricity generated.

Replicability
- If the PROINFA incentives are retained, the projects can be replicated.
- The incentives are required to sustain an attractive electrical energy price.

Long-Term Policy Framework
- We believe that such partnerships can influence long-term policy framework. Private participants can influence the policy debate by engaging with their trade associations on a regional scale and taking part in association discussions and activities surrounding this theme.
- The investment in this type of enterprise is dependent on incentive programs like PROINFA to provide long-term contracts and attractive financial compensation.

Conclusions

Organizations like e8 are, and will be, very important if they can influence country and/or regional governments to develop laws, norms and programs to stimulate public-private partnership. These organizatons can also work towards creating a more liquid market to trade carbon credits.

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Canada

Lessons Learned Case Study

The Project

- This transmission line project is in the province of Ontario, Canada, and provides grid connection to other off-grid First Nations (aboriginal) communities in the province.
- This project built a 115-kV transmission line and tapping station to connect three communities on the shore of James Bay to the grid, where they had previously relied on off-grid diesel supply.
- The objectives were to allow for growth, deal with the logistical difficulties in delivering diesel fuel to the communities, and eliminate the environmental impacts and risks of burning diesel and transporting the fuel.

Public-Private Participants

Public Sector:

- Hydro One Networks Inc. (HONI), the largest electricity transmission and distribution company in Ontario

Private Sector:

- Five Nations Energy Inc. (FNEI), the only First Nations-owned electricity transmission company in Canada

LESSONS LEARNED

Energy Policies

- Energy policy was not formally supportive of the initial low resource level of First Nations communities, as policy generally treated all connecting customers the same. However, the provincial government recognizes its obligations to First Nations communities and is trying to find ways within current policy under which it can address at least some opportunities to better the lives of citizens in those communities.
- In particular, on the electricity front, the government is using its owned entities, particularly Hydro One and Ontario Power Generation, as agents to address such opportunities.
- In this case, the partnership largely involved assistance in financing as described below. In addition, FNEI and HONI currently have an Operations and Maintenance Agreement. This is essential to the regulators and lenders to protect the system and FNEI's assets.

Financing

- FNEI was short $13 million in financing so they approached the Province for funding. The provincial government asked Hydro One to determine if there was a way to raise funds. Negotiations commenced to sell certain assets to HONI. To complete the financing, FNEI borrowed $2 million from the engineering firm SNC Lavalin, which has since been repaid.
- FNEI was required to insure the transmission assets, which was unaffordable after previous major ice storms. FNEI would have to self-insure. A Maximum Probable Loss study was undertaken and it was reported that a $5 million reserve would adequately cover any losses to the line. HONI was approached for assistance in raising $5 million and a backstop agreement was negotiated between HONI and FNEI, under which HONI would cover such losses for a maximum of $5 million until FNEI could build their Reserve Account through revenue received through a rates application from the Ontario Energy Board.
- The role of the public actors includes supporting public policy goals that are not fully reflected in economic drivers for the private sector. We would expect that the private actors will be amenable to investment in such partnerships even where there is not full compensation from traditional economic drivers, given the other social benefits, including political benefits, as long as the economic case is reasonable.

Replicability

- The project does provide a useful example for providing grid connection to other off-grid First Nations communities in the province and potentially for use in providing connection to other off-grid communities elsewhere.
- The Public-Private Partnership was key in this case because of the support of the provincial government. It is unclear if the terms of the Financing would have been agreed to by a private entity other than Hydro One.

Long-Term Policy Framework

- This partnership was not affected by formal emissions policy, although reduced emissions and other environmental impacts were an objective of the project. It is not Hydro One's primary goal to reduce emissions from electricity generation, but such partnerships can both have a positive impact in this regard and can be policy adjuncts that enable policies supportive of such reductions.

Research and Development

- The lowest transmission voltage Hydro One uses is nominally rated at 115 kV. In northern Ontario, it is operated at 132 kV and additional insulating "qualities" are added as necessary to permit this (basically, operated at higher voltage to reduce losses given distances in northern Ontario).

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China

Lessons Learned Case Study

The Project
- The Chengdu No. 6 Water Plant Build-Operate-Transfer (BOT) Project augments the available water supply in the city of Chengdu and will meet the projected increase in water requirements.
- The project will provide an additional 400,000 cubic meters of treated water daily to the city of Chengdu.

Note: While this is not an electricity project, the lessons learned are applicable.

Public-Private Participants
Public Sector:
- Chengdu Municipal Government (CMG)
- Chengdu Municipal Waterworks General Company (CWGC)

Private Sector:
- Chengdu Generale Dex Eaux-Marubeni Waterworks (CGEM)

LESSONS LEARNED

Energy Policies
- From 1980 to 1997 the urban population of China increased by 4% per year, while the total population increased by 1.4%. This urban growth resulted in an increase in the demand for water supply and other urban services.
- Although 95% of the urban population has access to piped water, there is a critical shortage of raw water supply or in water supply delivery capacities and wastewater treatment facilities in some cities.
- More attention is now being paid to the preparation and implementation of investment plans to address the water supply shortages.

Financing
- The government did not have the resources to finance the large investment requirement (~CNY60 billion), so it explored alternative funding sources, including private capital.
- The project includes a Build-Operate-Transfer (BOT) concession agreement between CGEM and the CMG under which CGEM will operate and maintain the treatment plant and then transfer it to CMG after 18 years. The transmission pipeline and discharge pipeline will be transferred to the CMG upon completion.
- Under an off-take agreement, CWGC will be obliged to take or pay for treated water supplied by CGEM. The water charge is divided between an operating charge (which has a fixed and floating portion) and a raw water charge. The CMG will be primary obligor under the off-take agreement and will ensure CWGC's compliance.

Replicability
- The successful implementation of the project motivated private capital to become more actively involved in the development of the country's infrastructure, particularly in the water sector.
- Several private sector water and wastewater projects were awarded in various cities in the People's Republic of China, some of which were under a BOT arrangement.

Long-Term Policy Framework
- In the mid 1990s, the Government attempted to introduce the BOT approach into the field of urban infrastructure. That led to the first legal foundation for private sector involvement and foreign capital investment in Chinese urban infrastructure.
- The entry of private capital in infrastructure development alleviated the financial burden from various local governments to construct basic infrastructure to sustain economic growth. Without such investment, it is likely that the country's infrastructure would not be able to support economic growth and may likely even undermine any economic gains achieved by the country.

Research and Development
- This project introduced new technology that processed treated water in a cost-effective manner and provided training in best practices for the management and operation of water treatment facilities.

Conclusions
Without the public-private partnership, the city of Chengdu would not have been able to expand its water supply capacity so quickly and be equipped to meet the demand for a growing economy.

The project introduced updated technology and service standards, comparable with global standards, in Chengdu's water supply sector. The CGEM's water quality now serves as a benchmark for the rest of the city's water supply.

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China

Lessons Learned Case Study

The Project

- Enel's experience in the Sino-Italian Cooperation Program for Environmental Protection (SICP)
- Launched in 1999 between the Italian Ministry of the Environment, the State Environmental Protection Administration (SEPA) and other main institutions in China, SICP is aimed at promoting sustainable development projects in China by leveraging, among others, the technologies provided by Italian companies for energy efficiency and air, water and land pollution control. The framework provides Enel with the opportunity to create effective networks of interested parties (local institutions and enterprises) to start investing in Clean Development Mechanism (CDM) projects. So far, Enel participates in over 90 projects in China (47 are already registered), ranging from hydro and wind power to the abatement of industrial gases and energy efficiency in large factories. Under Enel's September 2009 partnership agreement to apply CO_2 capture and storage technologies in China, the Chinese Ministry for Science and Technology and the Italian Ministry for the Environment began cooperation in the field of technologies for capturing and storing CO_2. In this context Enel committed to perform a feasibility study by constructing, at a Chinese coal-fired plant, a system of capturing CO_2 and injecting the CO_2 into an oilfield, thereby increasing crude oil production. Enel will share with its Chinese partners the experience it has gained in designing and constructing a pilot system for post-combustion CCS at its Plant in Brindisi (south Italy), which began operation in September 2010.

Public-Private Participants

Public Sector:

- Italian Ministry of the Environment, Land and Sea (IMELS), Italian Trade Commission, Italian Embassy of the People's Republic of China, the State Environmental Protection Administration of China, Chinese Ministry for Science and Technology

Private Sector:

- Various enterprises in the SICP (both Italian and Chinese); Enel only in the CCS partnership agreement

LESSONS LEARNED

Energy Policies

- The U.N. Framework Convention on Climate Change, the Kyoto Protocol and the establishment of the European Union Emissions Trading System (EU ETS) were the conditions that favored the Enel engagement in CDM. Local policies were essential in assessing the additionality and feasibility of the projects (in some cases local laws were adopted to remove bureaucratic hurdles in the implementation of the CDM project).
- Enel's experience was positive and convinced them that the design of effective energy-environmental policies should rely on clear policies and stable regulatory frameworks. Well-designed economic instruments such as a cap-and-trade system (ideally designed to be international) should be preferred to command-and-control approaches as they proved to have attracted investments by private sector.
- At the local level, awareness of the benefits of low-carbon initiatives should be encouraged by capacity-building programs to mobilize national institutions and establish confidence for private investments.
- The strength of the SICP allows Enel to capitalize on networking activities conducted in previous years on CDM to reach local institutions in a timely manner, to rapidly identify the most effective contacts and to receive proposals for taking part in projects.

Financing

- CDM projects produce Certified Emission Reductions (CERs) awarded on the carbon market. Usability of CERs for compliance purposes by European firms in the EU ETS was key to boosting the success of the market. Based on Enel's experience, financing models based on crediting and tradable mechanisms should be adopted to foster investment in climate-friendly technology projects. Market-based mechanisms, while efficient in promoting existing technologies, may therefore not be sufficient for the timely development of not-yet-competitive technologies (e.g. CCS, smart grids and innovative renewables). Complementary policy tools should be adopted and tailored to the maturity of technology.

Replicability

- Enel has implemented CDM projects in other countries besides China. Enel has tried to adopt, where possible, the same approach it has experienced in the context of SICP; to contact national institutions for assistance in identifying relevant stakeholders in foreign countries and markets.

Long-Term Policy Framework

- SICP is a model that could inspire the establishment of other multilateral cooperation frameworks on energy and climate. SICP could be replicated in the context of the development of Nationally Appropriate Mitigation Actions (NAMA) in developing countries and in other schemes based on sectoral approaches in energy and/or other fields (buildings, agriculture and water management). Public actors should create the conditions to keep the private sectors involved in policy framework designed for the long run.

Research and Development

- The agreement on CCS is a demonstration of the positive consequences of SICP in R&D. However, because for now it is a feasibility study only, it has limited scope to be deemed as a valuable model for an effective partnership in R&D.
- To ensure the proper support to future R&D emerging clean technologies, more structured public-private partnerships are needed, inspired by the SICP model.

Conclusions

The Sino-Italian Cooperation Program for Environmental Protection was a positive example of how a public-private partnership may engage the private sector in low-emission policies. Collaboration with national authorities is a key factor for a private firm to invest in non-domestic markets and to establish confidence with local institutions. Public policies should provide a general framework and guidance and create incentives to invest in low-emissions programs both at R&D level and in the implementation phases.

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San Cristóbal,
Galapagos Wind Project

Ecuador

Lessons Learned Case Study

The Project
- San Cristóbal – Galápagos 2.4-MW wind power project, complemented by solar photovoltaic (PV) systems and training
- First large-scale wind project in the Galapagos
- Built on a UNESCO World Heritage site, complementing the United Nations Development Programme (UNDP) renewable energy program for the Galapagos Islands
- Supplies an average of 40% of the island's electricity needs

Public-Private Participants

Public Sector:
- The Ministry of Electricity and Renewable Energy of the Republic of Ecuador
- Elegalapagos EP, the government-owned electricity utility for the Galápagos islands

Private Sector:
- Eólica San Cristóbal S.A. – EOLICSA: the owner and operator of the San Cristóbal Wind Power Project
- The company is owned by the San Cristobal Wind Project Commercial Trust: American Electric Power (U.S. utility) and RWE (German utility) are the "Settlors" and Elecgalapagos EP is the Adherent and the Beneficiary. AEP and RWE are members of the e8.

LESSONS LEARNED

Energy Policies
- Some policies on tariffs as subsidies for renewable energy, permitting and environmental issues had to be reviewed to facilitate project development.
- Public agencies were open to cooperate with private initiatives for the development of the project, particularly because of the importance of the Galápagos Islands as a World Nature Area.
- Rural Electrification Fund (FERUM Fund) rules were modified to permit financing of renewable energy projects.

Financing
- Funds from the e8 companies with complementary financial support from United Nations Foundation (UNF) were provided as grants.
- A commercial trust was structured to administer and manage the project funds. A private Ecuadorian financial agency was designated as the Trustee.
- The Ecuadoran government contributed with financial resources from the FERUM Fund.
- Ecuadoran law allowed the project to receive a percentage of income tax as voluntary donations from Ecuadoran taxpayers.
- Interests earned by funds were also a component of the financial structure.
- A small financial gap was filled with a short-term loan provided with UNF funds through UNDP.
- Project development and environmental studies were totally funded and led by charitable grant and technical expertise from e8 companies.
- A local public financial counterpart shall be provided to guarantee local involvement and support.

Replicability
- The Ecuadoran Government with UNDP support is replicating the project on nearby Baltra-Santa Cruz Island.

Long-term policy framework
- The success of the San Cristobal Project has encouraged the Ecuadorian Government to move rapidly in the direction of "zero fossil fuels" for the Galapagos by 2015.

Research and Development
- Some of the new projects could be implemented within a R&D framework such as flywheels, mini hydro pump storage, hybrid control systems and geothermal.
- Local private universities together with international and local NGOs could be interested in developing R&D programs in emerging clean technologies.

Conclusions
- Public-private partnership is the unique valid scheme for the development of energy programs in the Galapagos Islands.
- Because of islands' conditions and the government's limited resources, it is very hard (or impossible) to conduct a private participation on profitable basis; but, at least self-sustainability for operation and maintenance through adequate tariffs to users must be implemented.
- Public participation shall always be needed through a co-financing scheme, and by means of strong supports in all the development phases, like permitting, environmental assessments, importation procedures, taxes policies, tariffs regulations, etc.
- Key to the project's success was the cooperative work between developers with public agencies and the regulator.
- Strong involvement by the local project manager in all phases of the project contributed to success.

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India

Lessons Learned Case Study

The Project
- Demand-Side Management (DSM) through Agricultural Pumping Program – This project involved replacement of old irrigation pumps with energy-efficient irrigation pumps in collaboration with Kirloskar Brothers Ltd. in Indore, Ujjain and Dewas districts of Madhya Pradesh.

Public-Private Participants

Public Sector:
- Madhya Pradesh State Electricity Board (MPSEB, India)

Private Sector:
- Econoler International, BASIX, Verve International, and Kirloskar Brothers

LESSONS LEARNED

Energy Policies
- India is the second-largest generator of greenhouse gas (GHG) emissions in Asia with the energy sector producing 50% of the country's GHG emissions. This sector is also suffering from a high energy demand and a nearly nonexistent margin of electricity generation. Electricity shortages are common for the agriculture sector and several urban feeders during high season.
- As a solution to this specific problem, BASIX played a key role as an energy management firm to increase the capacity of the Indian power utilities through the development and implementation of a DSM program.
- At a macro level, this includes restructuring, unbundling, privatization and liberalization of traditional electric utility activities. The program also included policy decisions and choices affecting the availability and relative prices of alternative energy sources (e.g., diesel, biomass fuel).
- At a micro level, it includes the economic impact of tariffs on the consumption practices of the consumer.

Financing
- Econoler provided financial support to cover a part of the cost required for energy audits at customers' facilities.
- The development of a carbon financing mechanism that could be replicated to provide incremental financing for the future projects was also a fundamental goal of the project.
- From 2002–2005, Econoler implemented a large DSM initiative financed by the Canadian Climate Change Development Fund (CCCDF).
- Econoler continued DSM planning activities via the Energy Infrastructure Services Project (EISP) II funded by CIDA under its bilateral agreement.

Replicability
- The strategy was to develop and implement DSM modules with viable, replicable financing and implementation mechanisms with one utility (MPSEB).
- During the project, Econoler, with BASIX, developed a very successful approach to solve the current problems related to inefficiency and subsidized energy use that India faces.
- The project demonstrated that a market-based approach using agricultural stakeholders, electric utilities and carbon financing mechanisms can be developed to solve the challenges.
- The Principal Energy Secretary indicated that the government of Madhya Pradesh wanted to replicate the agriculture module in many regions of MP.
- In July 2005, the World Bank organized a large workshop gathering several Energy, Agriculture and Rural Secretaries of a few states, including Madhya Pradesh, Andhra Pradesh, Mahajan, Temul Nadu, and Kerala.
- Based on the project results and with CIDA support, the World Bank is showing a great interest in scaling up the project developed in MP.

Long-Term Policy Framework
- IREDA received a comprehensive capacity-building program to support the development of DSM programs and carbon financing mechanisms, including monitoring and validation of carbon emission reductions.
- Three new DSM cells were created within MPSEB, enabling the replication and the development of new DSM modules in all MP states.
- We enhanced our capacity to work in the energy efficiency field with the utilities and leveraged potential financing through transfer of the carbon emission reduction modeling technology.
- The agriculture module consisted of the replacement of existing electric pump sets and accessories, resulting in efficiency improvements of 25% to 49%.

Research and Development
- The outsourcing of program delivery to Energy Management Firms (BASIX, Verve, Kirloskar) was attractive to the utility (MPSEB) because it minimized the need for utility staff and capital resources for program delivery. It also allowed the utility to achieve a more cost-effective and sophisticated approach to energy management by relying on the Energy Management Firm (EMF) staff.
- By vertically integrating product sales, service and financing functions, EMFs can internalize costs of DSM program marketing and operation for potential revenue from equipment sales and leasing.
- BASIX demonstrated that EMF/utility partnerships can implement large-scale programs with modest cost, standardized products.

Conclusions

One of the attractive features of this kind of program, from the perspective of the utility, is that EMFs assume the financial risks associated with their agreement to absorb costs of customer outreach, equipment installation and maintenance during the lease period. Of course, the EMFs expect to more than offset those costs through revenues generated by equipment sales and leasing.

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India

Lessons Learned Case Study

The Project
- Petronet LNG Ltd (Dahej LNG Terminal Project)– The first phase of the project involved the construction and operation of a liquefied natural gas import and re-gasification terminal with a capacity of 5.0 million metric tons per annum (MMTPA) at Dahej in the State of Gujarat, India.
- In a second phase, the terminal was expanded to 10 MMTPA. This project supports India's sustainable economic development, as diesel engines and generators give way to LNG power, which has lower emission levels.

Public-Private Participants

The project is owned by Petronet LNG Ltd (PLL), a 50:50 public-private joint venture.

Public Sector:
- Half of Petronet's shares are held by four Indian state oil companies–Bharat Petroleum Corp. Ltd (BPCL), GAIL (India) Ltd, Indian Oil Corp. Ltd (IOL), and Oil and Natural Gas Corp. Ltd (ONGCL).

Private Sector:
- Gaz de France International (GDFI) holds a 10% equity stake, and the remaining 40% shares in Petronet are owned by Asian Development Bank (ADB) (5.2%) and other private interests.
- Petronet operates commercially as a private sector entity with an independent board. Petronet is implementing the project on a build-own-transfer basis under the concession agreement with the Gujarat Maritime Board for 30 years.

LESSONS LEARNED

Energy Policies
- India has national goals to reduce greenhouse gas emissions and strengthen energy security. The country aims to switch from oil and coal to natural gas. Currently, natural gas contributes only 8% to the country's energy requirement with a plan to increase it to 15% by 2012 and 20% by 2025.
- India's natural gas demand was met by domestically produced gas, but with the start-up of Petronet in April 2004, India started importing gas. The government is seeking new ways to expand the role of natural gas after the success of this project.
- In 1997, ADB provided technical assistance for a study on setting up a public-private joint venture to build and operate LNG terminals. As a result of the study, this concept was later incorporated in the Hydrocarbon Vision 2025, the Government framework for energy development.

Financing
- The first phase construction was financed through equity and debt with equity contributions from its sponsors– BPCL, GAIL, IOC, and ONGC, holding 50% in total, and Gaz de France International (GDFI) holding 10%, ADB 5.2%, and public investors 34.8%; the entire debt requirement was met by loans from Indian banks that carry floating interest rates.
- The expansion was financed through an ADB fixed interest rate loan of Rs 6.75 billion (~ $150 million), with ADB supported by a 50% partial credit guarantee from KfW Bankengruppe (KfW)
- For the expansion, the funding structure of rupee-denominated debt from ADB enabled KfW to participate by providing risk cover to ADB. KfW did not have rupee funding capacity, and without this association with ADB, could not have assisted a project that needed long-term rupee financing. KfW's partial credit guarantee also limited ADB's net exposure to Petronet, in line with ADB's single project exposure limit for private sector operations.

Replicability
- The joint venture and financing model could be replicated for other LNG or similar infrastructure projects.
- The success of this project, including ADB's support since project conceptualization, has had demonstrated effects and promoted strategic private sector investment in the gas sector.

Long-Term Policy Framework
- In this case, the public-private partnership helped India to move toward its targets of greater natural gas use.
- Private actors using their funds to provide a successful demonstration of a project's feasibility will encourage further investment, especially in the clean energy sectors, which is currently viewed as a high-risk sector for investors due to the high initial investment and uncertain policy frameworks of many Asian countries.
- The public actors must ensure a predictable and transparent policy and regulatory environment and must honor concession and off-take agreements.

Research and Development
- With respect to private participants, the participation of GDFI (Directorate General for Foreign Investments) assured transfer of the best available technology and know-how in LNG terminal operation.

Conclusions
For large-scale projects with a clean energy component, robust contractual structures with creditworthy entities, both on the input and off-take sides, are critical to project success and financial viability.

Strong governmental support coupled with management efficiencies and corporate governance contributed to the success of the Petronet LNG project. Experienced strategic stakeholders that provided technical expertise – exemplified here by Gaz de France and ADB – were also critical contributors.

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Project Summary:
http://www.adb.org/Projects/project.asp?id=37905
Project Information Document:
http://pid.adb.org/pid/PsView.htm?projNo=37905&seqNo=01&typeCd=4

Indonesia

Indonesia

Lessons Learned Case Study

The Project
- Surabaya, Indonesia – This government project is intended to ensure segregation and transport of food waste to a facility supplied by IUT Global for anaerobic digestion, where clean bio-gas is formed and used to generate clean energy (power and heat) through gas engines 24 hours a day, seven days a week.
- The project will prevent the formation of toxic leachates at landfill/dump sites that contaminate ground and surface drinking water sources. It will also mitigate methane emissions (a greenhouse gas) from the landfill and eliminate landfill fires that create air pollution.
- Bio-compost will also be produced as part of the process and can be recycled for agriculture and food production.

Public-Private Participants

Public Sector:
- Surabaya Municipal Government

Private Sector:
- IUT Global, Singapore – in partnership with Phoenix Energy, an Indonesian company.

LESSONS LEARNED

Energy Policies
- A lack of supportive energy policies slowed the progress of the project. There were no feed-in-tariffs or other government incentives to support the project. The project had to rely on a feasibility study based on government tipping fees for the food waste, normal electricity cost, sale of compost and Certified Emission Reductions.
- No new energy policies have been introduced to facilitate the project. Additional policy support would have accelerated the start of the project.

Financing
- The partnership employed project financing (equity/debt ratio of 30/70). The public entity provided the land. The private partner provided the equity and technology and debt from multilaterals like ADB and commercial banks.

Replicability
- This project is replicable and scalable to all cities globally. Sorting of food waste pre-digestion can be done through a manual sorting plant that can provide sustainable employment for scavengers working in dumps and landfills in most suburban developing city landfills.
- Most cities produce municipal solid wastes containing more than 50% organic or food waste, which should be diverted from a landfill into an anaerobic digestion plant like those produced by IUT Global.
- IUT Global provides design, project management, construction, testing and commissioning expertise. It will also operate and maintain the plant on a long-term concession and provide guarantees on power production.
- IUTG can also operate and maintain the existing landfill and extend its life sustainably or remediate if needed.

Long-Term Policy Framework
- Private participants can provide technology and know-how and help with the framework, but the public sector must have the political will and drive to implement the projects and, where necessary, mandate certain policies. Otherwise the Public-Private model will not work.
- Private participants must have a long-term stake and involvement in the project and there must be reasonably good returns and incentives to ensure their full commitment to the project.

Research and Development
- IUTG is very active in R&D in making the anaerobic digestion technology even more efficient and affordable. The company received the Singapore Energy Challenge 2010 award, including an award of nearly S$4 million to perfom joint R&D with the Nanyang Technological University.

Conclusions

Private participants provide the technology and operation of systems. Public participants provide funding, incentives, infrastructure and, where necessary, laws to ensure the successful implementation of the project.

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Kenya

Lessons Learned Case Study

The Project
- EDP's Kakuma UNHCR Refugee Camp Project – Environmental sustainable energy solutions for breaking the refugee poverty cycle at the Kakuma UNHCR Refugee Camp in Kenya.

Project Highlights:
- About 47 kW of photovoltaic solar systems installed and more than 1,500 low energy bulbs in 11 buildings. The metallic structures were built locally, as were the technical rooms for electrical equipment.
- 30 high-quality solar ovens.
- 4,000 solar lanterns to students in around 20 schools by entering into a written agreement between parents (or guardians), the students and their schools.
- 31 solar street lamps installed.
- Three solar water pumping systems for small-scale agriculture and reforestation installed.
- Technical training sessions for around 100 refugees.
- The environmental and social impact of the entire pilot project is to be monitored and assessed with the support of two specialised external partners.
- Detailed study of the lighting and energy use expenses incurred by refugees and the local community (hosts).

Public-Private Participants

Public Sector:
- UNHCR – United Nations High Commissioner for Refugees

Private Sector:
- EDP – Energias de Portugal (a Electricity provider)/ Fundação EDP – EDP Foundation, established by EDP – Energias de Portugal

LESSONS LEARNED

Energy Policies
- Local policies had no effect on project implementation because it took place under the auspices of the Kakuma UNHCR Refugee Camp in Kenya.

Financing
- EDP used its own funds as a donation to social causes.

Replicability
- The project provided a successful example of applying the experience gained in a fee-for-service model to providing modern energy services to poor people in off-grid regions.

Research and Development
- The project demonstrated how "one-off" solutions can be used in an operational field test to fulfill basic human needs and enable the productive use of energy.
- Offer a "must have" positive or neutral return, in EBITDA terms.

Conclusions

Success requires total commitment and full and proper stakeholder engagement.

e8 can promote experience-sharing (true networking) about financing opportunities and compile case studies of successful business models to provide energy to those in the greatest need.

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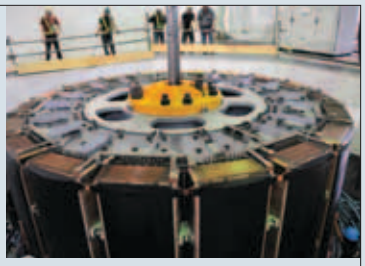
Laos

Lessons Learned Case Study



The Project
Nam Theun 2 Hydroelectric Project – a 1070-MW power plant on the Nam Theun River, a tributary of Mekong River, with a dam and a 450-km km^2 reservoir, 200km high voltage transmission lines. 95% of the power is exported to Thailand, 5% is for domestic use in Laos.

A sustainable hydropower project with:
- Financial compensation and help with population resettlement:
  - New infrastructures (electricity, housing, roads, schools)
  - Sanitation (dispensaries, drinking water)
- Transition to new economic activities (agriculture and livestock breeding, fisheries, etc.) with a targeted doubling of families' incomes by 2015
- Protection of cultural and religious heritage sites
- Environmental commitments:
  - Water quality management
  - Biodiversity protection on 4000km^2

Public-Private Participants
- Public Sector:
  - Government of Lao People's Democratic Republic, 25% shareholder:
    - Commits to use part of money generated for poverty alleviation programs
    - A state-owned company was established to off-take 5% of electricity generated
  - Electricity Generating Authority of Thailand, 25% shareholder:
    - Off-taker of 95% of electricity generated
  - International financial and development institutions:
    - World Bank with a $20M grant to Government of Laos for social and environmental issues and $130M guarantees to financiers for political risks
    - Asian Development Bank
    - European Investment Bank
    - Agence Française de Développement

- Private Sector:
  - Electricité de France (EDF), 35% shareholder
  - Ital-Thai Co, 15% shareholder
  - Contractors: EDF (Head), Ital-Thai/Nishimatsu (Civil works), ASEA Brown Boveri/General Electric/Clemessy (power station), Mitsubishi/JPower (transmission lines)
  - Financiers: 16 Thai and international commercial banks

LESSONS LEARNED

Energy Policies
- Large sustainable hydropower is possible.
- Energy AND development should be combined into a consistent plan.
- Choice of energy is key:
  - Costs and resources should be adapted to local conditions (hydro is cheap and 98% of Laos' hydro potential is untapped).
- Needs must be clearly identified:
  - Fuel Laos development through serving as "regional powerhouse" and serve important Thai electricity needs.

Financing
The cost of the project was a third of Laos' Gross Domestic Product.
- Need for subsidies to compensate for low local purchasing power.
- Regional cooperation is useful (Thailand as solvable off-taker for electricity).
- Additional financing required to uphold social and environmental sustainability.
- Risks and roles must be clearly distributed among stakeholders:
  - Investors shoulder industrial risks
  - MDA provide financial guarantees and shoulder policy risk through sustainability conditions set to loans to government
  - Governments guarantee integration of the project into a consistent development plan

Replicability
- Nam Theun has created a replicable model: Nam Ngiep and Nam Ngum 3

Long-Term Policy Framework
- Hydropower is affordable, clean and has strong potential in developing countries.
- The economics of hydro support an acceptable rate of return for banks.
- Sustainability issues need to be addressed (compliance with International Hydropower Association Guidelines).
- The infrastructure must fit into a consistent long-term development plan and technology choices must be consistent with local/regional context.
- Support by international institutions can be decisive to prompt action by authorities.

continued

Laos

Lessons Learned Case Study

Research and Development

- Research helped assess need for compensation to local populations, e.g., through assessment of forest carbon stocks and areas to be protected from deforestation.
- The project's net GHG footprint (biomass decay) is 6590t/year methane (mainly from swamps) before reservoir is filled; a total saving of 200Mt GHG over 100 years compared with Combined Cycle Gas equivalent.

Conclusions

- Large hydro can be compatible with highest sustainable development criteria.
- Access to modern energy is a key element of development. Both must be addressed together.
- Subsidies can be needed to ensure economic viability in the long run.
- Risks appropriately distributed:
  - Government
  - Sponsors
  - Insurers
  - Political risk guarantors
- Development plans must be adapted to local and regional circumstances and integrate energy with governance, capacity-building, economic development, channeling of funds, etc.
- Support by international institutions can be key for local authorities to actually implement those plans.

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Mozambique

Lessons Learned Case Study

The Project

- The objective of this public-private partnership is to serve households, small businesses and public institutions in rural areas in Mozambique with electricity by implementing small photovoltaic off-grid systems (PicoPV Systems) through two key components:
  - Local technicians, university students and dealers of electronic equipment are trained in technical skills. This knowledge transfer enables local personnel to size, install, maintain and repair PV systems.
  - The project supports the setup of a broad distribution network for off-grid PV systems by promoting local entrepreneurship to support the development of the private market in Mozambique. Local service providers are trained in business administration and business development to establish a retail system with solar shops throughout the country. Modern Pico systems are much less costly than traditional solar home systems.
- To improve the awareness of solar power in Mozambique and to increase the demand for PV systems, the project includes additional marketing activities.
- The project runs from 02/2010 – 05/2012.

Public-Private Participants

Public Sector:

- The German Ministry for Economic Cooperation and Development (BMZ) through the DEG (Deutsche Investitions- und Entwicklungsgesellschaft mbH)

Private Sector:

- Phaesun GmbH – An intermediator between national and international manufacturers and wholesale, giving technical advice on design, engineering and installation of small and medium-sized photovoltaic systems.

LESSONS LEARNED

Energy Policies

- Prior to the project, much of rural Mozambique was not electrified. The Mozambican governmental energy fund FUNAE supports large-scale projects in the area of renewable energies, but this has little impact on the development of a private market for small-scale PV products.
- No new policies were created as a result of this project.

Financing

- This is partly financed by the German Ministry for Economic Cooperation and Development through the DEG and by private companies.
- 50% of the project budget is financed by the BMZ through a government grant and 50% of the project costs is paid by the private partners. The project partners will establish "solar shops" and "solar kiosks" that sell systems and rent out lamps.

Replicability

- The project supports the setup of market-based diffusion of PV systems. Within the project, a distribution structure for Mozambique will be set up. The distribution structure can be used for other countries as well.

Long-Term Policy Framework

- The goal of this project is less to influence the policy framework and more to strengthen the private market in the target country to establish a framework for the diffusion of small PV off-grid applications.

Conclusions

- The major feature of this public-private partnership is the financing of the project's budget. Without the financial support of the BMZ, Phaesun GmbH would not have started a project to develop the market in Mozambique.

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Ifugao Rice Terraces of the Philppines Cordilleras

Nicaragua

Lessons Learned Case Study

The Project
- Nicaragua Wiwili Small Hydro CDM & Rural Electrification Project –1.48-MW hydropower plant and expansion of the distribution grid in the Nothern region of Nicaragua, Municipality of Wiwili

Public-Private Participants

Public Sector:
- Municipal Co. EMEEAW and the Ministry of Energy and Mines

Private Sector:
- e8

LESSONS LEARNED

Energy Policies
- The country energy policies are supporting the development of renewable energy projects and small hydropower schemes through various incentives such as tax and duties exemptions during construction and the first years of operation, and subsidizing the rural electrification.

Financing
- A combination of public funds (loan and grant) under the national rural electrification programme funded by the World Bank, private sector funds and a grant from Inter-American Development Bank (IADB).
- The public-private partnership helped define the guarantees to secure the different sources of funding. The participation of an internationally respected group of utilities to support the local public partner comforted international funding and development organizations such as the World Bank, IADB, UNDP.

Replicability
- There are several potential locations for small hydropower projects in the region. The feasibility study methodology, the bid documents, and partnership agreements can be useful in developing this potential. So far in Nicaragua, public-private partnerships have been used only for major infrastructure projects such as the airport.
- For small infrastructure projects, the role of a public-private partnership is yet to be proven; however, a more thorough definition of the roles and responsibilities as well as the long-term commitment of all stakeholders must be agreed upon prior to implementation.

Long-Term Policy Framework
- Public-Private partnerships for the development of renewable energy projects of small size must rely on well-coordinated participation of the partners and the financial contributors. There should be a mechanism (some kind of bank syndication process) for the assignment of the funds and their corresponding guarantees and liabilities.
- Where applicable, international financial organizations should participate through the public partners conditional to a public-private partnership agreement whereby the commitments and obligations of each partner are well defined both for the implementation and for the operating phases.
- A long-term policy should promote the participation of private actors by establishing mechanisms such as legal entities (trust, special PPP vehicle or other means), coordination entities or facilitation agencies.

Conclusions

Private partners can help in providing know-how and financial support. The public partner can contribute both as a facilitator before the communities and the different governing authorities and by offering incentives such as tax exemptions and subsidies to support the development of its population, especially in the case of infrastructure projects with long-term investments.

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Philippines

Lessons Learned Case Study

The Project
- e8 Ifugao-Ambangal Mini-hydro Project
- A project that will see the development of a 200-kW mini-hydro power plant and the establishment of a conservation fund to be financed by power sale revenues generated from the plant.

Public-Private Participants

Public Sector:
- Philippines Department of Energy (DOE), Provincial Government of Ifugao (PGI), Kiangan Municipal Government, Ifugao Cultural Heritage Office (ICHO), UNESCO National Commission of the Philippines

Private Sector:
- Tokyo Electric Power Company (TEPCO) and other e8 member companies (KANSAI, EDF, ENEL, RWE and Hydro Quebec)

LESSONS LEARNED

Energy Policies
- The Philippines is blessed with a lode of renewable energy resources such as an abundance of flowing rivers. The harnessing and utilization of such rich resources is a critical component of Philippines DOE's very dynamic strategy to provide energy for the country.
- The Philippines DOE will benefit from the pilot project by increasing the awareness of the local communities in regard to the advantages of implementing renewable energy projects as a way to promote the use of local resources for maintaining and improving their living. Approximately 110 MW of mini-hydro resources have been identified in the region.
- A special management unit has been created as part of the Ifugao Provincial Government to monitor and contribute to the implementation of the renewable energy project, to channel the income from power sales as well as to develop the technical and managerial resources to undertake replications of the pilot project in the region.
- As TEPCO also promotes eco-friendly energy, the Philippine DOE and TEPCO have decided to make the best use of these natural resources for this project. This will result in a sustainable energy supply for the people of the Philippines.

Financing
- Donation of (physical) plant from TEPCO to Philippine DOE.
- The results from the energy sales will be accrued against the O&M activities to ensure long-term sustainable operation of the power plant and to a special fund entirely dedicated to the rehabilitation of the rice terraces and irrigation systems, and other environmental and social enhancement projects.

Conclusions
- The Japan International Cooperation Agency could effectively participate in a demonstration of best practices in a public-private partnership.
- e8's experience can help provide a model for successful public-private partnerships.
- It is expected that the pilot project will draw the attention of the Philippines Government and the international community as a way to develop regional and rural electrification to stimulate economic growth while maintaining a worldwide recognized cultural heritage.

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Peru

Lessons Learned Case Study

The Project
- Renewable energy promotion

Public-Private Participants

Public Sector
- Ministry of Energy and Mines (MEM)

Private Sector
- Investors Corsorcio Cobra Peru, Tacna Solar, Panamericana Solar, Energia Eólica and Grupo T-Solar

LESSONS LEARNED

Energy Policies
- In May 2008, the government of Peru passed a law to promote investments for electricity generation from renewable resources.
- This law established a target of 5% of the electricity generated should be from renewable resources.
- Based on this law, MEM called for bids early in 2010.
- 27 projects totaling 440 MW were awarded: wind, biomass, solar and mini-hydro power plants. Plants will be operational before the end of 2012 and the energy produced will have priority dispatch in the system.

Financing
- The awarded investors received a 20-year contract to supply a certain amount of energy at the price solicited.
- This contract should be an important factor to get loans to finance and build this project.

Replicability
- This means of promoting investment in infrastructure is being used to promote private investments in generation and transmission lines.

Long-Term Policy Framework
- We consider bids for electrical infrastructure a good mechanism to attract new investors and improve concurrence in the electricity industry.
- We have no carbon-based projects for electricity generation but hydro power to be developed.
- Public actors must establish rules to facilitate private sector decisions to invest. But on the other side, the public sector must be highly qualified to manage the relationships with the private sector actors to avoid abuses.
- Rules must be clear and stable.

Research and Development
- R&D in emerging technologies are important, and the public sector must be prepared in advanced. However, priorities must be established according to each country's needs.

Conclusions
- Public-private partnership is very important to accelerate the development of the country.
- Strong and well-qualified authorities, clear rules and transparency are needed to increase confidence in these partnerships.

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Republic of

South Africa

Lessons Learned Case Study

The Project
- African Centre for Essential Community Services
- In 1995, a consortium of U.S. utilities and a South African utility joined forces to bring their electrical know-how to improve the African quality of life
- They formed the African Centre for Essential Community Services (CECS) to bring more electrification and electrotechnologies to Africa, particularly those that help supply clean water and improve health conditions

Public-Private Participants

Public Sector:
- African Centre for Essential Community Services

Private Sector:
- Electric Power Research Institute (EPRI)
- Consortium of U.S. utilities
- Eskom of Johannesburg, South Africa – Fifth-largest electric utility in the world that supplies more than half the total electricity in Africa

LESSONS LEARNED

Energy Policies
- A primary goal was to move EPRI technology through Eskom into Sub-Saharan Africa. The program initially focused on using electricity to improve water purification and health care. A key accomplishment included application of UV light to kill airborne tuberculosis.
- The challenges faced by the Republic of South Africa were numerous, particularly in the effort to improve the lot of the general populace.
- The African Centre for Essential Community Services was to be a key element in supporting the South African government objectives: electrification, adequate water supplies and improved health and health care for the citizens of South Africa.

Conclusions

Despite the extreme needs of the community and potential value of the project, it had to be discontinued about 1999 when funding sources were interrupted.

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Togo

Lessons Learned Case Study

The Project

- ContourGlobal Togo Tri-fuel Power Plant
- A state-of-the-art 100-MW power generation plant in Lomé, Togo's capital, which will ultimately use natural gas supplied by the West Africa gas pipeline. The plant will enable the Togolese to optimize their electric system purchases and add a substantial source of reliable, competitively priced power to their generation portfolio. The plant itself can use natural gas, diesel and heavy fuel oils as feedstock. Importantly, switching between fuel sources can be accomplished in minutes.

Public-Private Participants

Public Sector:

- Togo government

Private Sector:

- ContourGlobal – a company that develops, acquires and operates electric power and district heating businesses around the globe.

LESSONS LEARNED

Energy Policies

- Multiple power outages in the country and the lack of electricity to power the population's needs and activities were serious problems for Togo until the President of Togo decided to move forward with a public-private partnership to meet electricity requirements.

Financing

- The type of financing scheme that was used:
  - BOT: Build, operate, transfer
  - Land was given to the private company to install the equipment and all the investment was done by the private entity.
  - ContourGlobal signed a concession agreement with the government of Togo, as well as a long-term power purchase agreement to sell all of the plant's generation to the national distribution company. In July 2008, it received approval for $209 million USD in financing and political risk insurance from the Overseas Private Investment Corporation (OPIC) for the construction and term funding.

Replicability

- At every step, this project is replicable. Not only was it a success story because it solved Togo's electricity needs, but it also was done in a very short time period. Togo will welcome any similar project.
- Such partnerships bring transparency, transfer of technology and development to the table.
- Regulators can bring a legal framework that is clear and adaptable to the private investors.

Long-Term Policy Framework

- In Togo, the partnership with ContourGlobal is built to last at least 25 years, so there is a long-term vision.
- The private sector could help public entities to choose the best technology adapted for the need of the country.
- Legal framework and transparency are key factors to private investment.

Conclusion

- For a public-private partnership, the failure or success of such projects will depend on the ability of each party to respect mutual agreements.
- A legal framework has to be adapted to facilitate private investments. For the partnership to work, each party has to give something and each party has to gain something.
- For the best interest of the population, of the environment, and local development, it is good to have a strong partnership that works and lasts.

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Pico PV system at school in Mozambique

Tuvalu

Lessons Learned Case Study

The Project
- Tuvalu PV Project – A project to promote renewable energy generation in the Pacific islands. The project involved the installation of a 40-kW solar power generation plant, and an education component to facilitate maintenance and replacement by local engineers.
- The project sends a symbolic message to the world to address global warming.

Public-Private Participants
Public Sector:
- Government of Japan, Government of Tuvalu

Private Sector:
- Kansai Electric Power Co., Tokyo Electric Power Co., Pacific Power Association (PPA), Tuvalu Electricity Corporation

LESSONS LEARNED

Financial
- Preparatory survey prior to construction needs to be very precise to minimise costs associated with over- or under-estimations leading to additional and expensive material transportation.
- 75% was funded by Kansai Electric's donation, and the other 25% was funded by the grassroots grand aid (financial assistance scheme for development projects designed to meet the diverse needs of developing countries offered by government of Japan).

Replicability
- Education on providing spare parts and tools can be re-used on similar projects.
- The implementation of solar power systems on remote islands requires longer time estimation and strong logistical management (i.e., construction material transportation arrangements to the island, etc.).

Research and development
- We learned to consider salt effects (rust) not only for the PV system but also the air conditioning systems.
- Temperature control in the inverter room needs close monitoring in tropical locations like Tuvalu to avoid significant drops in operating rates due to high temperatures.
- Facilities' resistance against salt and water corrosion damage must be addressed during the construction phase and closely monitored upon commissioning.

Conclusions
Communication with the people of the local community and the government is the key to success. It is important to share information, provide education, and assure adequate awareness of the project.

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United States

Lessons Learned Case Study

The Project

- The 80-PLUS program is a voluntary program initiated through funding from the California Energy Commission and currently funded by utilities to improve the efficiency of power supplies to greater than 80%.
- Power supplies convert high-voltage alternating current into low-voltage direct current for use by electronic circuits in office equipment, telecommunications, and consumer electronics.
- More than 2.5 billion AC/DC power supplies are currently in use in the United States; about 6 to 10 billion worldwide. While the best power supplies are more than 90% efficient, some are only 20 to 40% efficient, consuming at least 2% of the US electricity production. Cutting the electricity usage of power supplies in half would save $3 billion per year.

Public-Private Participants

Public Sector:

- California Energy Commission

Private Sector:

- Electric Power Research Institute (EPRI)
- Ecos (consulting firm)
- Participating utilities

LESSONS LEARNED

Energy Policies

- The program continues and depends on an open exchange of design information, test methods, measured results, and other documents for its success.
- The Environmental Protection Agency (EPA) has incorporated 80-PLUS efficiency levels in its ENERGY STAR specifications.

Financing

- The California Energy Commission funded EPRI and Ecos, a consulting firm, to assess the efficiencies of modern power supplies and recommend strategies for improving them.
- They found that significant efficiency improvements could be made and test protocols developed. They then worked with multiple stakeholders (utilities, manufacturers, consumers, and government agencies) to encourage manufacturers to certify their power supplies at 80% or better efficiency.

Conclusions

In this public-private partnership, each party had a stake in the outcome so they worked together to achieve success.

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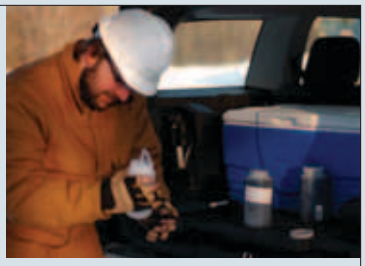
United States

Lessons Learned Case Study



The Project
- Midwest Regional Carbon Sequestration Partnership (MRCSP)
- A project to characterize the ability of the Midwest states to deploy carbon sequestration as a carbon mitigation strategy.

Public-Private Participants
Public Sector:
- U.S. Department of Energy (DOE)

Private Sector:
- Battelle, coal companies, utilities, pipeline service companies and universities

LESSONS LEARNED

Energy Policies
- The partnership has allowed for better site characterization and mapping of underground storage capabilities. U.S. energy policy that directionally supported the development and deployment of clean coal technologies (specifically carbon capture and storage) enabled this partnership to be effective. The purpose was to determine whether, in a carbon-constrained world, fossil fuel (coal) remains viable. Testing is occurring at a number of locations, including Duke Energy's East Bend facility. Indications are positive that the Midwest will be conducive to carbon capture and storage (CCS). This partnership is still active.
- The public-private partnership has allowed for innovation in addressing carbon and spreads the risk among the parties.

Financing
- DOE provides funding using the Federal appropriations process. Private companies have supplied some of the financing as well.

Replicability
- MRCSP is being replicated in other regions in the US. This replication shows the positive impact of the partnership. The replicability is dependent largely on the willingness of the private sector.

Long-Term Policy Framework
- The work of MRCSP can serve to demonstrate the viability of CCS technology. This is critical to the thinking process of regulators and legislators in designing a carbon policy that is technically feasible.
- The private sector can bring not just the experience of the public-private partnership to the policymakers but also the experience they have running their business (i.e., infrastructure improvements and human capital needed for CCS).
- The public actors must ensure that they provide a steady stream of support as promised so that the private sector can implement, particularly in the area of climate change, legislation and regulation clarity that are needed.

Research and Development
- The role of the private actors is to provide their share of the financing and a host site for a demonstration of the technology. The role of the public sector is to provide its share of the financing and facilitate the breakdown of regulatory barriers so that the project can move forward. Both parties need to provide monitoring to evaluate the success of the project.

Conclusions
This project could not have been done except as a public-private partnership because it is so expensive and technically challenging. The partnership mitigates the risks for all involved.

For More Information:
http://216.109.210.162/
http://fossil.energy.gov/sequestration/partnerships/2003sel_midwest.html

United States

Lessons Learned Case Study

The Project
- The Electric Power Research Institute Smart Grid Demonstration Initiative is a five-year collaborative research effort focused on design, implementation, and assessment of field demonstrations to address prevalent challenges with integrating distributed energy resources in grid and market operations to create a "Virtual Power Plant."
- The EPRI initiative provides guidance and support to the utility smart grid demonstration projects and aggregates, evaluates, and disseminates the results.

Public-Private Participants

Public Sector:
- The United States Department of Energy (DOE)

Private Sector:
- Electric Power Research Institute (EPRI)
- Twenty U.S. utilities

LESSONS LEARNED

Energy Policies
- This public/private partnership provides the opportunity to produce results that are meaningful to both public and private sponsors.
- For example, one of the key developments is a cost-benefit methodology. DOE and EPRI jointly funded development of Methodological Approach for Estimating the Benefits and Costs of Smart Grid Demonstration Projects (EPRI 1020342), which provides a framework for estimating benefits and costs associated with Smart Grid projects.

Financing
- Some of the host members have been awarded American Recovery and Reinvestment Act (ARRA) funds from the U.S. Department of Energy for smart grid implementation.

Replicability
- In this public/private partnership, both partners had a common goal: to develop an approach that could be used by the collaborators and others beyond the project.
- Projects now exist in France and Ireland, focusing on the intergration of renewable technologies. Partners include Electricite de France and Ireland's Electricity Supply Board.

Long-Term Policy Framework
- The project results will help utilities, policy-makers, and the Department of Energy understand the costs and benefits of specific smart grid projects.

Conclusions

This partnership will help the public and private participants advance their knowledge of the advantages and challenges associated with integrating smart grid technology into the U.S. electric system.

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