FINAL REPORT

THE ENERGY AND CLEAN AIR PROGRAM EVALUATION

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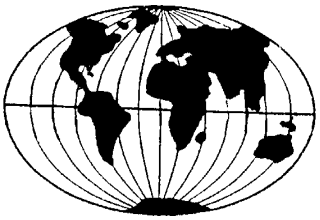

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ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AED	Academy for Educational Development
AMORE	Alliance for Mindanao Off-Grid Renewable Energy
ARMM	Autonomous Region in Muslim Mindanao
BRECDA	Barangay Renewable Energy and Community Development Association
CAA	Clean Air Act
CCIC	Climate Change Information Center
CRAVE	Champions in Reducing Air Pollution through Vehicle Emissions
DENR	Department of Environment and Natural Resources
DOE	Department of Energy-Philippines
DOTC	Department of Transportation and Communication
DTI	Department of Trade and Industry
ECAP	Energy and Clean Air Program
EETP	Energy and Environment Training Program
EPIRA	Electric Power Industry Reform Act
ERC	Energy Regulatory Commission-Philippines
FDI	Foreign Direct Investment
GEF	Global Environmental Facility (UNDP)
GRP	Government of the Republic of the Philippines
IIE	Institute for International Education
IIEC	International Institute for Energy Conservation
IES	Integrated Environmental Strategies
MMDA	Metro Manila Development Authority
NEA	National Electrification Administration
NGO	nongovernmental organization
NPC	National Power Corporation
OEM	Office of Environmental Management (of USAID)
PCCMP	Philippines Climate Change Mitigation Program
PEPP	Philippine Energy Partnership Program
PETC	Private Emissions Testing Center
SO	Strategic Objective
TRANSCO	National Transmission Company
UNDP	United Nations Development Program
USAEP	United States Asia Environmental Partnership
USAID	United States Agency for International Development
VEC	Vehicle Emission Control
WESM	Wholesale Electricity Spot Market

EXECUTIVE SUMMARY

The nine energy and clean air programs directed by the Office of Environmental Management of USAID, Manila aim to (1) encourage effective energy sector reform, (2) support the use of clean local fuels, including natural gas and renewable energy resources and technologies, and (3) reduce vehicle air pollution in and around Manila. A team of five international energy, transport, and environmental experts supplied by Development Associates and Nathan Associates, of Arlington, Virginia, evaluated each of these programs and operational procedures.

To review these programs in addition to the general energy environment of the Philippines, the team visited energy facilities and met with the energy and environmental organizations of the Government of the Republic of the Philippines, with relevant private institutions, and with nongovernmental organizations. It also conferred with energy experts at government agencies, multilateral development banks, and private firms. A summary discussion of each program follows.

The ***Energy and Environmental Training Program (EETP)***—and its predecessor, the ***Philippine Climate Change Mitigation Program (PCCMP)***—is the primary USAID resource for technical assistance and training. This program assists with formulating and implementing policies on energy and electric power reform, renewable energy utilization, expansion of clean natural gas, improved energy efficiency, and reduction of vehicle emissions. These subjects cover the entire spectrum of current energy policy. The contractor has completed requested tasks efficiently and effectively. We believe, however, that due to the diversity of activities, delineating the technical assistance and training tasks into separate components could provide more effective for operations.

The aim of the ***Alliance for Mindanao Off-Grid Renewable Energy (AMORE)*** project is to electrify rural communities in Western and Central Mindanao using clean renewable energy systems. In the coming year the project will be providing electric power for homes with solar panels and mini-hydro power. In addition to electrifying residential areas, the project also uses renewable energy to develop livelihood activities in the area such as fish drying and seaweed farming into viable enterprises. It has also introduced rural telecommunications services. The village level Barangay Renewable Energy and Community Development Association (BRECDA) has successfully combined its renewable energy component with community development by requiring participants to be involved in all aspects of renewable energy system operation, including training, education and developing governance in an environmentally positive manner. This approach has brought the positive prospects of energy, electric lights, reduced conflict and optimism to the Muslim region of Mindanao. This successful approach can be replicated to facilitate electrification in other rural areas.

The purpose of the ***Vehicle Emission Control (VEC)*** project is to inform bus and jeepney operators of problems and potential solutions related to emissions. The project, which combines government policy support, implementation, and public awareness, has been very effective in providing information and training on reducing vehicle emissions among Jeepney drivers. Training should be expanded in scope and required for all drivers. It should also be replicated for drivers of buses and motorized tricycles, both a significant source of emissions in Metro Manila.

Technical support and training provided by the ***U.S. Department of Energy*** to the Philippines's Department of Energy (**DOE**) and Energy Regulatory Commission (**ERC**) under a Participating Agency Service Agreement (PASA) has been effective in providing the structural capacity to facilitate the devolution of competitive energy policy initiatives. The growing importance of keeping the professional staff cognizant of activities including current data collection, analysis, and web dissemination methodologies will require continued training by the U.S. DOE: Energy Information Administration and consultants. The expertise provided to ERC has ensured that it has the dynamic framework to operate in a competitive energy and electric power environment. The resources available at the U.S. DOE will support continued restructuring of the electric power sector, as well as implementation of natural gas and renewable energy policy. This PASA arrangement could be expanded to include technical and policy support designed to increase the use of geothermal and clean renewable energy resources for electric power, utilizing the range of resources available in the Philippines.

The ***Philippine Energy Partnership Program (PEPP)*** provides a means for senior electric power industry executives in both the Philippines and the United States to meet and exchange ideas. Creativity is the synthesis of ideas and the partnerships initiated under PEPP have generated new ideas and encouraged sharing of management and operating concepts between participants. The ERC has also participated in this effort in a positive manner. A PEPP energy conference scheduled for the summer of 2004 in Manila could be an important forum for electric power experts to share ideas and experiences about adjusting for risk in a changing regulatory environment.

The ***US-Asian Environmental Partnership (US-AEP)*** is a global program that promotes the use of advanced environmental technologies, primarily in the industrial sector. In Asia, the program has concentrated on reducing small motor vehicle emissions and developing media support with regard to clean air problems, energy efficiency, and energy conservation. Activities are initiated by national requirements. At present, no direct energy-related activities are scheduled for the Philippines. This program, however, could provide flexible support for technical exchanges on subjects tailored to the Philippines energy and environmental concerns.

The ***Climate Change Information Center (CCIC)*** collects environmental data, generates information, and researches the potential impact of climate change. The CCIC has provided public information, training, and program coordination with regard to alternative energy fuels, clean technologies, resource assessments, and environmental mapping. The public briefings and training convey climate change information to a wide audience, including those at the secondary education level as well as at the college level. The CCIC integrated environmental strategies (IES) can help provide vital information on the impact of vehicle emissions on morbidity and mortality and thereby help focus public perception of this issue. The institute has sponsored award-winning books, videos, and maps of energy resources for the Philippines. The CCIC's effective data collection, research, and training indicate that it could become a global climate hub for South Asia as well as the Philippines.

The aim of the ***Energy Efficiency Program*** is to make energy use more efficient and to promote energy conservation. The purpose of its Green Buildings program is to provide information, advice, and technical support for use of energy-efficient technologies in buildings. The Energy Service COmpany (ESCO) concept—of private entrepreneurs promoting long-term investment in energy-saving technologies, while participating as facilitators who benefit from cost savings—

was encouraged by this program. The program, however, focused on renovating existing industrial buildings during a period when massive new construction lowered costs and eroded incentives for the energy service company concept. Nonetheless, the concept could be effectively employed and the program should be refocused in the transport and industrial sector which have a large potential for utilizing energy efficient technologies.

In reviewing program operations, we found no significant problems that constrained implementation of USAID policy. Primary and support contractors have provided effective technical assistance and training as requested, and they respond flexibly to changing technical, economic, political, and organizational requirements. The strong inter-organizational structure currently enjoyed by USAID, Government of the Republic of the Philippines (GRP) agencies, and contractors will be more efficient once an expanded web portal is implemented. The extensive resources available to USAID through the ECA contractors are an effective base for providing the wide range of technical assistance and training anticipated during the mid-term period.

Our prognostic analysis, developed as part of this evaluation, can provide fertile ground for new and innovative activities within the mandate of the USAID energy and clean air group. These suggested activities include the following:

- Supporting the devolution of the natural gas and electric power sector;
- Improving the availability of new and renewable energy technologies (e.g., wind farms, pumped storage, PV, micro-hydro, mini-geothermal, bioenergy, and combinations of bivalent technologies in rural areas;
- Improving the availability of indigenous natural gas as a clean energy resource to meet electric power, industrial, commercial, residential, and transportation requirements;
- Reducing vehicle emissions by making anti-fumes belching enforcement units more effective;
- Creating a statistical unit to measure and evaluate the impact of electric power, industrial, commercial and transport activities on urban air pollution;
- Reducing emissions from vehicles, motorcycles and motorized tricycles;
- Using agricultural resource residuals (e.g., coconuts, sugar, rice, hulks, etc.) for supplemental generation of electric power in rural areas;
- Improving the availability, reliability and cost of the energy and electric power situation in some high risk locations in urban areas;
- Expanding the resource base and utilization of indigenous geothermal capacity to meet electric power and industrial requirements;
- Assisting the National Rural Electric Cooperative Association provide technical, financial and managerial support to improve the stability and effectiveness of electric cooperatives;
- Providing training and technical support in advanced energy data and analysis methodologies to DOE and ERC technical staff and improving both their software and hardware capabilities;
- Reducing the potential risk and impact of traumatic curtailments of energy supplies;
- Increasing foreign direct investments in the energy and electric power sector;
- Improving energy and environmental policy in response to external economic concerns;
- Improving the structural ability of energy policymaking and implementing institutions.

The ECA programs interact with the multilateral development agencies which are primary sources of technical and financial support for energy and environmental programs in the Philippines. The **World Bank** programs concentrate on energy resource development and rural electrification; the **ADB** concentrates on improving air quality by reducing emissions in the metro Manila region; and the **United Nations Development Program** concentrates on renewable energy projects. Many industrial countries also provide development assistance and aid on subjects of mutual interest. The USAID experience in the energy and environmental sector can help provide support to the GRP in prioritizing programs for multilateral development agencies and sharing insights with the numerous programs initiated by bilateral arrangements, nongovernmental organizations (NGOs), and other development organizations.

As market globalization has accelerated over the past decade, foreign direct investments have become more fungible on both a sector and regional basis. This has encouraged energy-related economic efficiencies in many countries. The energy and electric power market in the Philippines is liberalizing, privatizing, and restructuring. In response to this change the role of government agencies has adjusted. Before restructuring, the DOE and other agencies made the primary decisions concerning resource developments. Since restructuring, DOE, ERC and other agencies have concentrated on regulating the diverse energy industry and promoting a framework for efficient policies using flexible market mechanisms. USAID can assist this laudable development by sharing experiences with GRP decision makers and providing essential support to the energy sector to improve the devolution of energy policies.

THE ENERGY AND CLEAN AIR PROGRAM EVALUATION

1. INTRODUCTION

At the request of USAID, Manila, Development Associates, in conjunction with Nathan Associates, of Arlington, Virginia, conducted the Energy and Clean Air Program Evaluation (ECAPE) during September and October, 2003. The team consisted of international experts experienced in evaluating programs worldwide, particularly projects involving energy and the environment, as well as economic development programs in the Philippines:

- **Michael Gaffen**, an energy program and policy analyst (Team Leader);
- **Roni Adiv**, an environmental and transportation specialist;
- **Ted Regino**, an expert on the energy and transport situation in the Philippines;
- **Dave Sood**, a renewable and rural energy expert;
- **Larry Wasserman**, an institutional development expert.

This team met with existing and past support contractors for USAID Energy and Clean Air (ECA) programs and with a wide range of support and related organizations in Manila. This included the ECA executive committee, the Department of Energy, the Energy Regulatory Commission, National Power Corporation, National Economic Development Authority, in addition to the participants of USAID-supported ECA programs. The team was unable to visit Mindanao (where the activities of one project are based) because the U.S. Embassy security office issued a constraint on travel there by the team prior to the visit of the President to Manila on October 18, 2003. Instead, village directors and key program participants traveled to Manila to discuss the project activities with the team.

To ensure a solid understanding of the energy situation in the Philippines, the team visited several Philippine energy facilities, including the 1,200 MW natural gas power plant at Ilijan, the SHELL Malampaya off-shore gas plant at Batangas, and the 400 MW MAKBAN geothermal power plant at Lugana (Figures 1-3). The team also observed operations of vehicle testing stations in Manila, as well as anti-smoke belching procedures, and visited private emissions testing center and MVIS. At the end of our evaluation we presented our diagnostic evaluation and prognostic analysis directly to the USAID ECA Office of Environmental Management (Figure 4).

Figure 1. 1200 MW Natural Gas Plant

Figure 2. Shell Natural Gas Storage Facility

This report distills our independent evaluation of each project and our suggestions for improvement. The diagnostic evaluation in Section 2 covers the effectiveness of specific technical assistance, the impact of each program, prospects for sustainability, potential challenges and recommendations. The diagnosis of operations in Section 3 describes the strong working relationships enjoyed by USAID and ECA contractors, as well as operational areas that could be improved. The prognostic analysis in Section 4 is based on our broad understanding of the current and prospective energy and environmental situation in the Philippines and the region and the potential support that USAID/Manila could provide. This prognosis presents a diverse range of new initiatives that reflects the aims of the USAID/Manila energy and clean air group and that respond to the requirements of the Philippine government to encourage a more responsive energy environment while improving prospects for economic growth. A summary of the conclusions are presented in Section 5, and generic recommendations are included in Section 6. Documents and studies consulted during the course of our evaluation are listed in Appendix A. The ECA program and agency contacts are listed in Appendix B; and energy-related work of other international organizations is described in Appendix C. Our evaluation is intended to review the existing programs and provide a framework for effective support and initiatives that continue to improve the energy and environmental situation in the Philippines for the mid-term period.

Figure 3. MAKBAN Geothermal Power Plant

Figure 4. ESCAPE Evaluation Team meeting with USAID/Manila

2. DIAGNOSTIC EVALUATION

In this section we review the background, purpose, accomplishments, effectiveness, and potential problems of the nine projects supported by USAID/Manila. We also draw lessons learned and provide recommendations for improvement. The projects covered are:

1. Energy Environment Training Program (EETP),
2. Alliance for Mindanao Off-grid Rural Electrification Program (AMORE),
3. Vehicle Emissions Control Project (VEC),
4. Philippines Climate Change Mitigation Program (PCCMP),
5. U.S. Department of Energy,
6. Philippine Energy Partnership Program (PEPP),
7. United States-Asia Environmental Partnership (US-AEP),
8. Development of Climate Change Information Center (CCIC) at the Manila Observatory, and
9. Energy Efficiency Program.

ENERGY ENVIRONMENT TRAINING PROGRAM

The Philippines has one of the highest electricity tariff rates in Asia. The Electricity Industry Reform Act (EPIRA) passed in June 2001 aims to lower tariff rates and make the country more globally competitive. USAID, as part of the ECA technical assistance helped promulgate the legislation and draft implementing rules and regulations for EPIRA. The Energy Environment Training Program (EETP) is an effective joint response of USAID and the Department of Energy (DOE) to challenges faced by the government of the Republic of the Philippines in promoting and facilitating policy and structural reforms in the energy and environmental sectors. EETP is a continuation of the USAID/Manila Philippines Climate Change Mitigation Program (PCCMP).

Purpose

The purpose of EETP is to accelerate restructuring and privatization of the electric power industry; expand the use of clean fuels such as natural gas and renewable energy; develop a natural gas regulatory framework; increase efficiency in power generation, transmission, and end-use; maintain and expand forest cover; and help bring about policy reforms in the transportation sector. It also aims to help the Philippine government formulate and implement policies in energy sector reform, renewable energy, natural gas, and reduction of vehicle emissions. It is also intended to help build institutional capacity and strengthen the communication capacity and outreach of various government partners in (1) implementing EPIRA, (2) developing the Philippine natural gas industry, (3) reducing vehicular emissions under the Clean Air Act, and (4) strengthening the Philippines renewable energy sector. These activities are consistent with Philippine government efforts to alleviate poverty, improve the global competitiveness of the country, encourage private sector investment, privatize government corporations, and improve the quality of life for Philippines.

Description

EETP envisions an energy environment sector that fosters dynamic, responsive, and strong public-private sector partnership in implementing reforms. The program is driven by the same issues, objectives, and strategies that defined its predecessor, the PCCMP. As a technical assistance program it promotes and facilitates implementation of power sector reforms. The program is helping develop opportunities in policy implementation, institutional capacity building, and communication. EETP strategy is to build on the initiatives and accomplishments of and to make full use of proven mechanisms, initiatives, and processes developed under the PCCMP.

Activities

The EETP work plan has 8 activities that fall into one of three components: policy development and implementation, institutional capacity building, communications and social marketing. Each component consists of tasks that are intended to contribute to a USAID intermediate result and SO4 strategic targets. The work program includes special projects as a mechanism for funding tasks within the program's "technical scope" and that are requested in response to emerging and urgent concerns.

Time Frame

As a continuation of the PCCMP (February 1998–September 2002), EETP's timeframe is October 2002–June 2004.

Funding

EETP started out with a not-to-exceed budget of $4.3 million. In June 2003, USAID obligated $2.9 million to June 2004.

Participants

It includes the DOE, the Energy Regulatory Commission (ERC), National Power Commission, National Transmission Company (TRANSCO), Department of Environment and Natural Resources (DENR), Department of Trade and Industry and Department of Transportation and Communication.

Contractors

Academy for Education Development, U.S.-based, is the prime contractor. Subcontractors are PA Consulting of Washington, DC, Soluziona Philippines (technical needs assessments) from October to December 2002; Campaigns, Advocacy, & Public Relations, Inc., and Corporate Image Dimensions, Inc. (communications).

Accomplishments

EETP accomplishments arise from the results of the predecessor project, continuing concerns or requests from Philippine government partner agencies, or items in EETP's technical scope of work. EETP completed more than 70 tasks between October 1, 2002 and August 2003.

Policy Development and Implementation

Technical advisers and analysts supported policy development for the wholesale electricity spot market and Philippine grid and distribution code; rules harmonization review and stakeholder consultations; natural gas policy setting and legislation; implementation of private emissions testing centers; and review of a renewable energy bill.

Institutional Capacity Building

EETP conducted or sponsored about 15 short-term training programs (two international), seminars, and workshops on EPIRA and natural gas, improving the skills and knowledge of more than 400 individuals. Organizational development advisers helped guide initial reorganization of the National Power Corporation, smoothing its transition to a new role under the EPIRA.

Communication and Social Marketing

EETP organized 25 forums, roundtables, consultations, and conferences covering EPIRA, alternative fuels, and vehicle emissions reduction, including timely support for DOE's EPIRA communication program to mitigate the power crisis in the Cebu-Negros-Panay sub grid. EETP supported two DOE-sponsored investment promotion events, one in the United States and one in Japan. These events showcased power sector reform and natural gas development in the Philippines.

Monitoring Measurements

No specific quantitative measurements are assigned to EETP. Overall performance measures are guided by the Mission's SO framework and needs of Philippine government partners. Accordingly, EETP has developed its own performance measures. For instance, to evaluate responsiveness EETP schedules regular "coordination meetings" attended by Philippine government partners. Findings are analyzed and lessons learned incorporated in future activities. A report is also sent to USAID. EETP also provides USAID with information on training activities, areas covered, and budgets at various intervals. EETP has no set number of training activities assigned. Further, USAID also makes courtesy calls to Philippine government partners to discuss the impact of EETP activities. The results of those meetings are provided to EETP.

Sustainability of Activities

Sustainability will depend on the absorptive capacity of local participating organizations; the ability of government partners, such as DOE and ERC, to reorganize efficiently (as required under EPIRA), to absorb new operating procedures and execute recommended measures. The ability and diversity of the participants to absorb innovative tasks and provide new perspectives is also a key factor. In addition, the limited availability and training for equipment (such as IT

SW/HW for executing SPOT markets) may be an impediment. Given these conditions, the sustainability of the program appears good but cannot be predicted with certainty.

Potential Concerns or Problems

Effectiveness of Partnerships

EETP has been instrumental in developing a number of partnerships, but there are constraints on the availability of counterpart staff and resources. This can dilute the impact of the program. The participating agencies of the Philippine government need to be more active in the design and implementation of each task with the contractors. This will help provide more depth to the GRP capacity in the energy and clean air programs.

Lack of Organizational Readiness among Philippine Government Partners

This problem lies in the reorganization called for under EPIRA. For example, both the DOE and ERC are recruiting personnel, redefining functions, and identifying staff competencies, all under serious budgetary constraints. These agencies also seem overwhelmed by EPIRA mandates. While this may be temporary, it could weaken the project. Under these circumstances, EETP's effectiveness can be diluted, for example, because of the lack of training or non-functioning units in these organizations.

Need for Larger Pool of Consultants

EETP has used foreign and local consultants to diffuse knowledge and to ground recommendations in international experience as well as local practices. In addition to local academia as trainers, EETP implementation seems to have some consultant constraints. We would recommend a larger list containing a wider range of topical experts and effective consultants be developed who are both technically competent and experienced in both the global and regional concerns of the energy and clean air programs.

Lessons Learned

Several lessons have been learned from PCCMP, the predecessor program and EETP:

- Technical needs assessment must be continuous to support the program. Installing a monitoring and evaluation system at the start of a task or project can be helpful.
- The Philippine based research and development institutions can assist in implementing policy reforms. They should be used more effectively and can provide a long-term base of knowledge in a topical area.
- Individual and institutional capability development in energy and environmental community including government agencies, industry players, NGOs, academic institutions and others needs to be a continuous process.
- Coalition building through informal multisector meetings is critical in promoting and facilitating reforms.
- Stronger collaboration with other USAID co-operators (e.g., US-DOE, US-AEP, CCIC, and IPC) is needed.

Replication Potential

Given the success of most of its activities, EEPT's approach in the context of its mission offers good chance of replication.

Recommendations

EETP seems to be a collection of activities, covering the wide range of energy and environmental topics. Included are technical, economic and institutional analysis of policy reform in energy, renewable energy production and utilization, improved energy efficiency in power generation, commercial, industrial and residential facilities, environmental aspects of vehicle emissions and communications. It covers training and legislative and policy support in energy and natural gas use. It also covers vehicular pollution, which is a complicated topic itself, with technical, health, and policy aspects, jeepney, bus and tricycle unions, and other political issues. Trying to deal with such diverse areas could weaken the program impact. To be more effective, it is suggested that EETP be separated into two or more sub-programs managed by topical specialists. Vehicular pollution should be covered under a separate project. Within the assigned scope, a dedicated project would be more effective.

To help define and reduce vehicular pollution, USAID should develop studies similar to the Comparative Environmental Risk Assessment provided (by USAID) for Cairo, Egypt and Ahmedabad, India, cities with higher population and pollution levels. The detailed analysis of the impact of vehicle pollution on morbidity and mortality in the Metro Manila region can provide essential analysis. Such studies and others produce detailed data that can be used in media campaigns to make the public more aware of the dangers of pollution.. USAID should intermittently monitor and review the effectiveness of its program's impact on government partners and adjust activities and funding as necessary.

ALLIANCE FOR MINDANAO OFF-GRID RENEWABLE ENERGY (AMORE) PROGRAM

The AMORE program is designed to provide renewable energy support for community electrification projects in Mindanao. The approach is focused on assistance to community based private sector efforts and to provide a framework for democracy in this region of social conflict. Energy can be considered a fundamental catalyst for economic and political growth that is essential for reducing poverty in this volatile region. These barangays cannot be economically electrified from the existing national grid. However, the renewable energy approach can provide a unique laboratory to initiate a process for democratic governance using electrification as the motivating factor. AMORE has approached the potential concerns of this process with creativity and is optimistically implementing this model based on multisectoral cooperation. The replication potential is good if the program overcomes the myriad concerns and is successful.

Purpose

The Alliance for Mindanao Off-grid Renewable Energy (AMORE) program supports community electrification projects in Mindanao to prompt social and economic development. If successful, AMORE will drive economic development in Muslim Mindanao by improving the quality of life

in rural areas through intensive community organization centered on stand-alone sustainable renewable energy systems.

Description

AMORE plans to electrify at least 160 remote rural barangays (communities) in Western and Central Mindanao with particular focus on ARMM provinces where the electrification level is the lowest in the Philippines, with clean renewable energy systems under the rural electrification program.

Key elements of the AMORE program include:

- Electrification of at least 5,000 households in remote communities in conflict-affected areas of Zamboanga Sibugay, Zamboanga City, Davao, Basilan, Sulu, Tawi-Tawi, Sultan Kudarat, Maguindanao and South Catabato;
- Increased use of clean and indigenous fuels such as renewable energy—primarily solar module systems and micro-hydro;
- Community organizing activities to adequately prepare the beneficiaries to sustain the programs benefits; micro-enterprise and social service development projects using renewable energy as a key element, and environmental management initiatives;
- Assistance in implementing the national goal of electrification and utilization of environment friendly renewable energy technologies.

The USAID funded AMORE supports the use of independent power producers and other private firms to cofinance and implement rural electrification. Specific activities include establishing sustainable renewable energy–based rural electrification projects through development of community participation and effective social preparation, including community consultation, development needs assessment, and preparation of livelihood and community infrastructure projects, securing community participation and buy-in, and building local technical and financial capacity to manage renewable energy systems. It focuses on social community preparation for renewable energy projects funded by independent power producers and other private sector entities under their legal obligation to fund "missionary" (i.e., subsidized) electrification projects.

Activities

Community Electrification

- As part of the community electrification process beginning in April 2002, solar batteries were provided to 300 households in 10 barangays in Tawi-Tawi. In addition, 30 solar charging stations and 20 streetlights were set up in 10 barangays. It is estimated that about a ton of CO_2 emissions are avoided for every three households electrified under the program.

Creation of community development associations

- AMORE organized village-level community based institutions called the Barangay Renewable Energy and Community Development Associations, or BRECDA. The project is attempting to develop each BRECDA into organizations that can sustain the

project's initial investments and accomplishments, helping communities to manage the program independently.

Promotion of peace and increased awareness of renewable energy

- The program achieved a degree of effectiveness in reintegrating former rebels into operations. Rural electrification also helped participating residents get more working time and create income-generating opportunities. In addition, there is an enhanced awareness and interest generated among LGUs, policy-makers and others.

Community empowerment

- Participating communities are better organized, cooperative and better equipped to self-sustainability. For instance, all BRECDA's have their own bylaws that guide them in their day-to-day activities.

Microenterprise enhancement

- The program aims to enhance livelihood sources such as fish drying and seaweed cultivation and processing. It conducts a participatory livelihood assessment to ensure the viability of AMORE livelihood projects.

Social service improvement

- Renewable energy powered satellite-based SMART public calling offices are being set up. A pilot multi-purpose telecenter at a micro-hydro site. Plans for RE potable water supply projects are set.

  - ***Timeframe.*** February 2002–September 2004. Phase-out from all communities by June 2004.
  - ***Funding.*** USAID funding for the three-year period is $ 7.9 million, which includes 37 percent for indirect costs. Contribution equivalent of $3 million by Mirant Philippines are in the form of photovoltaic modules and systems. Mirant is participating in AMORE to help defray missionary electrification costs and in fulfillment of corporate social responsibility. .
  - ***Program participants.*** In addition to USAID and Winrock International, the prime contractor, the participants include the National Power Corporation for the supply of renewable energy equipment for 10 Sulu barangays; Davao Light & Power for 5 Davao barangays, QUEDANCOR, the credit group of the Dept. of Agriculture, providing Php 25M low interest micro-financing for BRECDA members livelihood projects; BPRE for livelihood technology support; SMART Communications, Inc. for the installation of renewable energy–powered public calling offices in selected barangays; and Mindanao-based NGOs for efficient and lower-cost program implementation in selected sites.
    Other participants include the DOE, ARMM, and Mirant Philippines, the country's biggest independent power producer. Mirant owns more than 2,000 MW of installed generating capacity and is part owner and operator of the natural gas-fired, 1,200 MW Ilijan power plant, opened in 2002. Mirant is a subsidiary of the U.S.-based Mirant Corporation. Mirant is supporting the project through purchase of renewable energy

equipment for many project barangays. The DOE backs AMORE's promotion of renewable energy for rural electrification, and the ARMM provides political support for the program.

- ***Contractors and Subcontractor:*** To implement the AMORE program, USAID selected Winrock International, a U.S.-based, international NGO as the prime contractor. Partners are SMART Communications, QUEDANCOR, Mirant Philippines, SIAP, DLPC and BPRE. Subcontractors are Sibat, Preferred Energy, Inc., WorldWater (Philippines), Sustainable Rural Enterprise, Maguindanoan Development Foundation, Inc., Yamog Renewable Energy Development Group, Seaweed Industry Association of Philippines, Davao Light and Power, Bureau of Post Harvest Research, IRG-Philippines, and Yakan Ministry Foundation, Inc. .

Accomplishments

- ***Off-grid electrification.*** As of October 2003, 94 off-grid barangays of a targeted total of 160 had been energized: 50 in Tawi-Tawi, 25 in Basilan, 6 in Maguindanao, 13 in Sulu, and the rest in other areas.
- ***Organization of BRECDAs.*** AMORE has organized 139 BRECDAs out of 160 to ensure the sustainability of the program benefits by community involvement. Of these, 63 are registered with the Department of Labor and Employment. All have their own constitutions and bylaws that guide the activities.
- ***Microhydro power feasibility studies.*** Seven potential sites have been identified for potential micro hydro power system installation, with system capacity ranging from 7 to 98 kW.
- The project has extended lights into the evening which permits the extension of small business operations, enabled night-time social activities in addition to help improve performance among students. This process has enhanced the self government and economic development aims of AMORE.
- Micro enterprise enhancement has improved livelihood sources such as fish drying and seaweed collection and processing.

Monitoring Measurements

Indicators of the results of the AMORE program are:

- Barangays electrified
- Community empowerment
- Improved security
- Increased confidence in civil society and government
- Expanded training skills
- Multisectoral partnerships
- Microenterprise development
- Social services improvement
- Environmental management
- Barangays self governance
- Peace promotion.

Sustainability of Activities

The initial AMORE project design recognized the importance of sustainability. The project benefited from the sustainability framework study and lessons learned from five previous energy and community development projects in the Philippines in formulating sustainability criteria (Municipal Solar Infrastructure Project, isang Libong Bahay, Pailaw Mula sa Araw, O'ILAW Program, and Rural Photovoltaic Electrification).

The AMORE community based organizations, BRECDA, show potential for sustainability. From discussions with AMORE staff and project beneficiaries, BRECDA's role in sustaining project benefits, at least in the short term, is evident. In the long term, sustainability will depend on successful synergistic and integrated activities. For this, the government will need to subsidize photovoltaic purchases and introduce other policy measures. The current private sector participation includes Mirant Philippines donating solar home systems. Similarly, micro-hydro may require considerable initial investment. Project benefits will be sustainable if some form of assistance and oversight is continued post-AMORE. This may be necessary because not only photovoltaics, but electrification itself, is new to the project areas and the management and maintenance requirements for the system can be substantial.

Potential Concerns or Problems

The AMORE program has concentrated on only two renewable energy technologies—photovoltaic and micro-hydro. Photovoltaic power is an expensive option among renewables and relies on high technology, a potential drawback for the area's rural population. The program currently has limited plans to include other technologies, such as biomass-based energy systems (including biogas and biomass gasification). These technologies have been used successfully in similar settings and are considered appropriate for the project area. The project area, like most of the Philippines, has abundant biomass, including animal dung, crop residues, and similar feed stocks. Also, the program covers only very basic household energy needs and the expansion plans are likely to present technical and financial challenges for sustainability. Other issues and concern particularly for photovoltaic based electric power include: (1) lack of spare parts and qualified technicians at the local level; (2) lack of user education and training (for wider application); (3) high cost of providing after-sales service, particularly in remote and hilly terrain; (4) replacement of used and defective batteries; (5) low interest by the private sector due to marginal benefits and potentially high risks. Electricity technologies, like all technological advances, must be carefully evaluated before being deployed and risk mitigation measures must be prepared. However, all social advances have concerns to encounter and a carefully planned approach can mitigate these factors.

Lessons Learned

Although the program has achieved the milestones, successes have not been in all areas. Any expansion or replication could include other appropriate renewable energy technologies and, in addition to electricity, provide direct heat for other applications such as crop drying or introduce solar cookers, successfully used in Kenya and South Africa. In addition, small appliances such as solar lanterns could be useful. While renewable energy systems have little or no fuel, operation, or maintenance costs, the initial capital costs are much higher than for fossil-fuel generation systems, and those costs must be financed and amortized over the life of the project. This initial

high capital cost of such projects requires the commitment of the Government and other organizations in partnering for both the initial and long term operations for sustainability.

Replication Potential

AMORE's model offers good replication potential if similar financial support is available. But the suitability of each new site would need to be evaluated to insure it meets the technical, financial and logistic challenges for replication. Widening the program will require continuing support. Given the high initial cost of photovoltaics, it is unlikely that other communities will follow photovoltaic without financial help and support, such as from BRECDAs. For an expanded program the option of other renewable energy technologies should be considered based on the available resources and the capacity of the community to manage and absorb the system.

Recommendations

- Consider the expanded use of other renewable energy technologies, including biomass energy systems. The project area has plenty of suitable feedstock including: agricultural and animal wastes. Agricultural wastes come primarily from extensive coconut, banana, vegetable, and corn production in the local area.
- The potential to incorporate improved cook stoves for household cooking should be considered. Such stoves are inexpensive ($20–$25 each), more fuel-efficient, and less polluting. They are used widely in India, Kenya, and South Africa. Such designs can be replicated easily and deployed cost-effectively in the AMORE project areas.
- Consider solar street lights and lanterns, which also come in portable versions, for economical provision of light at remote locations.
- For long-term sustainability and wider deployment of photovoltaics, explore alternative financial resources (preferably in-house) or improved cost-recovery mechanisms. An effective cost recovery mechanism for the solar home systems is need for sustainability and must be assured to the user.
- Improve the existing framework for battery-charging process for wider deployment. The concerns for safety and health in battery use, maintenance and recycling can provide problems in the rural locations. This can be mitigated by careful training and continued management support.
- Incorporate longer-lasting deep cycle batteries in photovoltaic-power deployment extensively in the region. For remote areas, high-quality, reliable, and maintenance-free batteries would be useful. AMORE should also re-evaluate the appropriateness of photovoltaic-based BCS as the technology option in the future. Experience in the Philippines and other countries shows that such systems are eventually discontinued.
- Better integration with other development activities is recommended. This can contribute to economic growth, create additional income generation opportunities, and enhance employment in the area.
- Use the full range of energy services, rather than the current limited applications to meet the needs of unserved populations and to sustain project benefits is also recommended. Doing so will give potential energy suppliers the best chance to satisfy consumer demand with the best solution and will not undermine the financial viability of the resulting businesses by imposing restrictions.

VEHICLE EMISSIONS CONTROL PROGRAM

Recent studies indicate that the Philippine transportation sector, especially public transport vehicles such as *jeepneys* and buses, now contributes substantially to the severe air pollution in metropolitan Manila. Hazardous vehicle emissions affect human health and increase greenhouse gases that result in global warming. Severe air pollution is aggravated by inefficient repair and maintenance of older vehicles. Improving air quality in the urban centers requires broad-based support but data indicate that only 30 percent of metropolitan Manila residents are aware of the dangers of uncontrolled vehicle emissions.

Purpose

The purpose of the VEC project is to promote public awareness and actions to reduce vehicle emissions. It also aims to provide basic preventive maintenance skills to the drivers and operators of public utility vehicles. This project complements policy analysis and other activities aimed at reducing vehicle emissions under the Energy and Clean Air Program (ECAP) in the USAID Office of Environment Management.

Description

The contractor named the project Root Cause Approach to Vehicle Emission Control in Metro Manila. The project proponents theorized that the main source, or root cause, of air pollution from vehicles plying the metro Manila roads is poorly calibrated fuel injection pumps of diesel engines.

Activities

- Promote fuel combustion efficiency as the best approach to reducing vehicle emissions and educate public utility vehicle operators and drivers about preventive maintenance and diesel engine calibration. Provide technical assistance to public transport operators in developing and implementing a vehicle preventive maintenance program.
- Design and implement a public awareness strategy to reduce vehicle emissions in metro Manila using tools that will promote understanding of the benefits of clean air quality and the ill effects of excessive vehicle emissions on public health while emphasizing the sustainability of efforts (radio skits, comic magazines, public forums, etc.). Provide technical information to radio and television drama script writers.
- Organize and support coalitions that will advocate for policy reforms to reduce vehicle emissions in metro Manila, such as phasing out the importation of second-hand engines that do not meet Philippine emission standards, introducing clean alternative fuels, and encouraging the use of four-stroke motorcycle engines.
- Implement capacity building programs that will sustain activities initiated by stakeholders.
- Measure the progress of the program.

Time frame

The project started August 15, 2002, and will be implemented for 2 years.

Funding

Total project cost is approximately $400,000. Table 1 shows the status of the project budget in U.S. and local currency.

TABLE 1. Status of VEC Project Funding

	US$ (000)	Philippine Peso Equivalent*
Project Funding LOP Grant	394	19,691,737
Counterpart	128	6,368,285
Expenditure to Date of Grant	195	9,736,703
Expenditure to Date of Counterpart	64	3,217,692

Note: Numbers rounded.
Exchange rate: PhP50:$1

PhP 1,755,033 has been spent to purchase equipment and furniture and to refurbish vehicles. PhP 462,944 was spent to train 774 participants or PhP 600/$12 per individual (excluding fees and salaries of trainers.) Table 2 breaks down funding by source and activity.

TABLE 2. VEC Project Funding by Source and Activity (in pesos)

Activity	Grant	Counterpart	Total	%
Information Management	1,800,160	485,743	2,285,903	9%
Partnering with Partnership for Clean Air, NGOs, government agencies and team building	1,124,909	745,098	1,870,007	7%
Coalition Building	1,887,958	560,596	2,448,554	9%
Program Development	3,619,908	2,107,051	5,726,959	22%
IEC Activities	6,301,361	1,495,835	7,797,196	30%
Program Monitoring and Control	2,768,832	696,690	3,465,522	13%
Sustaining Program with LTO	2,068,609	277,272	2,345,881	9%
Recipient Contracted Audit	120,000	0	120,000	0%
Total	19,691,737	6,368,285	26,060,022	100%

Note: Numbers rounded. Exchange rate: PhP50:$1

- ***Program participants.*** Entirely private sector.
- ***Contractor.*** Infinite Progressions Corporation, Unit 402 Alabang Corporate Center, Km. 25 West Service Road, Alabang, Muntinlupa City 1771, Metro Manila.

Accomplishments

During the first year, the VEC project achieved the following:

- Established a reputable training center for vehicle emissions control for the public transport sector (NGOs, public transport associations, and government agencies such as DENR and Department of Transportation and Communication).
- Procured signatures of four of the six major national public transport organizations as well as other transport groups to a memorandum of understanding affirming the signatories' commitment to practice and propagate preventive vehicle maintenance, comply with vehicle emission standards, and support the Clean Air Act.
- Conducted 22 one-day seminars on preventive diesel vehicle maintenance for 774 operators and drivers of public utility vehicles, mostly *jeepneys*.
- Selected two or three participants from each seminar (for a total of 30 to 50), to form a group, Champions in Reducing Air Pollution through Vehicle Emissions (CRAVE), to persuade other drivers and operators to carry out proper vehicle preventive maintenance.
- Repaired and refurbished four *jeepneys* to demonstrate to skeptical public utility operators and drivers that refurbishing diesel engines is a wise investment that will improve engine performance and reduce downtime, thus increasing profits while contributing to cleaner air.

Monitoring Measurements

The project called for progress to be measured with the following indicators:

- Organization of a coalition of urban dwellers (urban poor, lower-middle-income and other stakeholders such as *jeepney* and bus drivers) to promote reduction of vehicle emissions, through an effective national motor vehicle inspection and emission testing system, and community-supported anti-smoke-belching activities;
- Development of creative media to educate stakeholders about the dangers of excessive vehicle exhaust emissions;
- Well-informed and highly committed environmental champions working closely with the legislative and executive branches on implementation of policy reform regarding reduction of vehicle emissions;
- Formation of collaborative linkages strengthened with local partners.

The evaluation team noted that there is no provision for monitoring if the seminar/workshop participants put into practice what they learned. The members of the core group of drivers have no reporting system, so their activities with their fellow drivers cannot be monitored. A feedback system is also missing to indicate how the pilot vehicles draw attention from the public or if other operators had their vehicles refurbished.

It can be assumed from the discussions that the seminars/workshops, pilot vehicles, and core group organization influenced drivers and operators who have not participated in the project. Because seminars/workshops are conducted for *jeepney* federation members and because most, if not all, participants belong to a specific *jeepney* group, it would not be difficult to set up a monitoring system through the federations' auspices. During the second year of the project, training for core group members will be conducted and monthly meetings will be held.

Sustainability of Activities

A program to fund and equip automotive shops in exchange for the owners' conducting awareness programs on vehicle preventive maintenance could be sustainable and self-financing.

Although USAID funding for VEC is primarily for the awareness program, it did pay for emission testing equipment (two opacity meters, two 5-gas analyzer and one diesel injection pump calibrating machines) as well so that proper vehicle maintenance and repair can be demonstrated in the pilot vehicle component of the project. During the second year of the project, the contractor will transform the automotive workshop into a profit center so that it can offer vehicle emission control services as well as training.

When the VEC project is completed, the contractor intends to continue operating the automotive shop as a vehicle emissions control shop, relying on the fact that the shop is established in the public transport sector and can attract a clientele made up of the same operators and drivers who participated in the seminars/workshops and realized the benefits of proper vehicle preventive maintenance. In the long term, shop patrons who trained on the merits of proper vehicle maintenance will likely continue using vehicles complying with emission standards. This scheme is akin to an insurance broker's educating a potential client about the merits of insurance and then making a sale.

Nevertheless, there is concern about whether the core group (i.e., CRAVE) can sustain the recruitment of vehicle preventive maintenance advocates. Convincing a driver to forego a day's earnings to attend a seminar/workshop is an achievement in itself. If the members of the core group are asked to persuade fellow drivers and operators about the merits of proper vehicle preventive maintenance (let alone undergo more intensive three-day trainings as trainers), some sort of monetary incentive for their work should be included.

Potential Concerns or Problems

Although awareness programs are important in reducing air pollution, they should not be the main instrument for doing so. The Clean Air Act and its implementing rules and regulations enumerate steps that the government should take to reduce air pollution. Among these are institutional changes as well as establishment of emission testing centers where vehicles would have to be inspected annually to renew their registration.

But the system of private emission testing centers is not working as envisioned. Moreover, the government's own center, which is less expensive than the private centers (PhP 70 versus PhP 300), does not have enough equipment to test all the public utility vehicles in line. (The queue is so long that personnel issue 90-day certificates of emission compliance when vehicle owners submit a promissory note that states abidance to the standards for the next 90 days.) An inefficient private system puts the onus of reducing air pollution on awareness programs such as this VEC project and roadside apprehension programs—both of which are less cost-effective than the private emissions testing center program. Furthermore, both use government instead of private sector investments. Indeed, the contractor has reported this problem as one that would jeopardize the recruitment of more participants into the seminar/workshops.

Although program participants were not asked why they attended the seminar/workshops, we can surmise that they wanted to learn about the benefits of vehicle preventive maintenance than to contribute to cleaner air and better health. What is more, even if operators are willing to refurbish their engines and conduct preventive maintenance, banks do not find them creditworthy enough to finance the repairs. Thus, the operators have difficulty securing bank loans to finance initial ownership, repair, maintenance, and refurbishment.

Lessons Learned

During the first year of the project, the contractor conducted more workshops than called for (22 versus 17) and reported that the *jeepney* federation heads are requesting more workshops. This demand for training in vehicle preventive maintenance, despite the readiness of the emissions testing program to grant certificates of compliance for non-compliant vehicles, indicates that public utility operators and drivers seek more education on vehicle maintenance, profit from such training, and recognize the benefits to be gained.

Replication Potential

About 65,000 *jeepneys* and 3,500 buses are on the streets of metro Manila. About 100 or so more seminars and workshops would be necessary for all public utility operators and drivers to attend the awareness and training programs at least once, although this number could be lower if the core group (CRAVE) becomes an effective force. Given the success of workshops as well as the potential of the contractor to continue providing emissions control services, the project can be replicated and expanded to other similarly qualified contractors. But expanding or replicating the project should go hand-in-hand with improving the private emissions testing center system and other emission-checking programs.

Recommendations

The VEC project has been crafted to appeal to *jeepney* and bus operators and drivers who can profit by applying the techniques learned in workshops. However, for the project to be more effective, a midterm review of its design and implementation strategy is necessary. The following areas need to be examined:

- ***Distinguish between jeepney operators and drivers.*** At present, drivers rent *jeepneys* from operators on a daily basis for a fixed amount. Drivers pay for fuel and oil but operators are responsible for repairs, annual registration, and emissions testing. Drivers have almost no responsibility to maintain *jeepneys*, so operators should attend the workshops. A separate workshop about the ill effects of air pollution (with a pulmonary specialist as speaker) and better driving habits (through videos) as well as an abbreviated preventive maintenance course, should be designed for drivers in the hope that the seminar will galvanize them into persuading operators to participate in a preventive maintenance program.
- ***Add a focus on bus operators and drivers.*** New workshops could be held for bus operators or drivers. It is noted that bus organizations are more varied and complicated than jeepney organizations, and a bus operator may own a fleet of buses instead of just a few *jeepneys*.

- ***Institute a monitoring program.*** To help assess achievement of the project's objectives, a monitoring system should be instituted. This would consist of calling on participants (through their respective federations) a few months after the workshop to assess if they apply the techniques they learned. The same holds true for monitoring the activities of the core group (CRAVE).
- ***Improve efficiency of emission-testing programs.*** Replication of the project could start only after related programs for improving the efficiency of the emissions-testing program and roadside apprehension program have been started.
- ***Institute similar program for tricycle drivers and operators.*** The project does not cover tricycle drivers and operators. A similar program should be undertaken along the lines of the seminars undertaken by Academy for Educational Development/Miriam PEACE and National Confederation of Tricycle Owners and Drivers Association, but strengthened with coalition-building and demonstration-vehicle components.
- ***Institute microfinancing program for jeepney operators.*** Another gap in the VEC project is the lack of financing system for *jeepney* operators to finance refurbishment of their vehicles. A microfinancing program could help fill this gap.
- ***Investigate requiring all drivers and operators of public utility vehicles to take workshops.*** The seminar/workshops could be integrated into the annual franchise renewal process or the professional drivers' license renewal process. The workshop could be an abbreviated version of the preventive maintenance workshop, the training officers could be members of CRAVE, and USAID could help develop the workshop materials. The recommended level is a four-hour training session each quarter that could be a forum for educating drivers on a wide range of issues. Attendance at such workshops is voluntary at this time.

PHILIPPINES CLIMATE CHANGE MITIGATION PROGRAM

The PCCMP was initiated in 1996 as part of the USAID global climate change mitigation strategy after the signing of the bilateral agreement between the United States and the Philippines on climate change. Global climate change issues have been of increasing importance and this program provided support to policies designed to reduce the emission of greenhouse gases by the increase of clean electric power production, improve energy efficiency and focused energy-environmental initiatives.

Purpose

The PCCMP was designed to mitigate global climate change patterns and improve the ecosystem. The initial project focus—global climate change—was revised to include more emphasis on electric power sector restructuring and privatization and renewable energy. The program included technical assistance for energy policy initiatives, supporting the restructuring of the electric power sector and the privatization of the National Power Corporation to increase competition, improve energy efficiency, promote clean indigenous fuels, and lower electric rates for consumers.

Description

Activities

- **Increase clean electric power generation—**assisting in the development of the natural gas industry, encouraging the use of cleaner coal to meet stringent air quality standards, and expanding the use of renewable energy power systems;
- **Improve energy efficiency—**reducing energy losses in the generation, transmission, and distribution of power, translating directly into reduced demand for electricity;
- **Improve electric power and environment-related policies, planning, and compliance mechanisms**—providing technical, analytical, and institutional support in formulating policies, regulations, and statutes to improve the socioeconomic aspects of the energy structure.

Timeframe

The PCCMP started as a three-year activity but was extended. Program implementation began on January 12, 1998 and ended, after extension, September 30, 2002. Many PCCMP tasks moved into the follow-on program, EETP, in October 2002

Funding

Funding for the PCCMP was $4.9 million. Improved power sector policy, planning, and environmental tasks accounted for 55 percent of activities. Energy efficiency and clean fuel generation systems each accounted for about 22 percent of funding.

Program participants

The program steering committee included the Philippines DOE Undersecretary. Other Philippine participants included the National Power Corporation, Philippine National Oil Company, National Electrification Administration, Department of Environment and Natural Resources (DENR), National Economic Development Authority, Energy Regulatory Board, and other NGOs and private contractors. The PCCMP was directed by PA Consulting, formerly Hagler Bailly Consulting. Subcontractors were Black & Veatch, International Institute for Education, Price Waterhouse, Energy Development and Utilization Foundation, and Geosphere Technologies. The 16 resource firms and international partners included U.S. Energy Association, U.S. Export Council for Renewable Energy, Lawrence Berkeley National Lab, BP Solar, and Stone and Webster. The 23 additional resource firms included several academic institutes in the Philippines. There were 18 additional independent consultants.

Accomplishments

Technical assistance—experts, information, and technology—were provided for the design, development, and implementation of policies:

- ***Power industry restructuring.*** Assisted DOE and Energy Regulatory Board in finalizing the national electric grid and distribution codes. Trained on the technical, operational, and regulatory aspects of developing and enforcing codes; passage of the EPIRA electric

power legislation; formation of the Citizen Action for Reform in the Electric Sector, a coalition of academic institutions supporting electric power reform through interactive dialogue;

- ***Climate Change Information Center.*** Helped establish the CCIC as the focal point for information, analysis, and technical support on global climate change impacts.
- ***Market-based incentives.*** Provided information on market-based incentives for emission controls used successfully in other countries by conducting workshops presenting quantitative and qualitative methods;
- ***Energy planning tools.*** Provided technical and analytical support to the DOE, including integrated resource planning concepts, methods and tools for planning, modeling, and analysis; resources for investment decisions on greenhouse gas emission mitigation; demand/supply analysis for the electric power sector using the MARKAL model;
- ***Improved energy efficiency.*** Conducted a survey of heat-loss rates in six power plants, identified poor performance areas, and recommended procedures to improve operations at each facility;
- ***Alternative technologies.*** Provided technical support to and market assessment of the prospects for fuel cell technology and strategy for promotion of fuel cells. This included identifying appropriate fuel cell technologies for indigenous resources;
- ***Electrification.*** Performed strategic evaluation of selected electric cooperatives.

Monitoring Measurements

The initial plan of developing a single performance monitoring unit to measure progress in reducing greenhouse gas emissions on a unitary quantitative basis was adjusted to include program monitoring and performance at the four monitor levels. The steering committee monitored overall performance on an annual basis. The executive committee monitored execution of tasks on a monthly basis. The program management team monitored technical assistance for the quarterly activity reports. The activity implementers monitored and reviewed each task on the monthly activity status reports.

The results of the monitoring and reporting system indicated that 305,000 MWh of clean energy was directly or indirectly contributed by this program. These data were converted to MMMT of avoided CO2 emissions. However, projected data of emission reductions during the limited two-year period from the baseline year of 1998 can be spurious and may not reliably indicate energy efficiencies or emissions reduced. Furthermore, this period was the beginning of an economic decline in the Philippines that reduced economic growth and lowered electric power requirements. Data from a 10 to 20 year period are usually needed to develop an indicative trend or statistically valid movement, particularly for factors related to energy technology.

The initial targets were designed to measure reduction in global warming through several procedures. USAID planning requirements provided the following targets to implement PCCMP: 1) initiating the construction of more than 3,800 MW of new generation capacity utilizing clean fuels and 2) eliminating the need for 200 MW of generation capacity by improving the efficiency of electric generation, transmission, and distribution during the first two years of the program.

Sustainability of Activities

The diverse activities covered under the PCCMP include a number that are self-sustainable. Others will require continued support, and still others may require periodic adjustments to assure viability.

Potential Concerns or Problems

The initial aim of the PCCMP was to provide support to the development of a global climate change mitigation strategy by providing technical assistance on energy policy. The broad international concerns of global climate change have continued, and although not the primary focus of ECAP activities, may reemerge during the next several years as an important issue requiring substantial efforts.

Lessons Learned

Energy and clean air policy–related activities can change during the period of contract implementation because of changes in economic, political, and technical requirements, and allowances for adjustments in the design, operation, measurement, and performance criteria should be included in the project design mechanism.

Replication Potential

The topics initiated in this activity are of continuing importance and expansion of support will be required as normal energy policy is developed. A number of the national topics and issues could be replicated on an island or local basis.

Recommendations

See discussion under EETP.

U. S. DEPARTMENT OF ENERGY

The U.S. Department of Energy (USDOE) is providing a range of technical support to the Philippine Department of Energy (DOE) and Energy Regulatory Commission (ERC) using a Participating Agency Service Agreement (PASA). The USDOE, and its predecessor agencies, have provided energy-related statistics and analysis, and a wide range of technical, economic, and financial support for energy initiatives, including electric power developments and implementation strategies for using clean coal and renewable energy.

Purpose

The PASA is designed to provide direct support to the Philippine DOE and ERC from USDOE staff and consultants to promote sustainable energy developments in an environmentally acceptable manner. The program provides policy, technical, computer, and regulatory expertise to advance the development of energy policy in addition to improving the collection of energy data in the Philippines. This PASA provides a process by which energy experts in both agencies can collaborate.

Description

This PASA has included an exchange of experts to assist the Philippines in its electric power and natural gas restructuring and implementation policy as well as training on information systems. The six areas of technical support defined in the original agreement (power sector restructuring, gas policy development, information systems, energy environment action plan, clean coal technology, and strategic energy planning and pricing) were reduced to three: power sector restructuring, natural gas policy development, and energy information systems.

Activities

- Support for electric power restructuring
- A series of seminars on data exchange, forecasting and analysis, information technology, energy modeling, and emission estimation provided by economists, statisticians, and information specialists from the USDOE: Energy Information Administration to the Philippine DOE energy information systems. A new series of seminars on current procedures in data collection and analysis is under preparation.
- A separate support arrangement using U.S. regulatory expert consultants to provide technical assistance in four categories to facilitate the transition of the disbanded Energy Regulatory Board to the ERC:

  Cost-of-service ratemaking in a competitive environment;
  Unbundled rate case preparation and analysis;
  Policy analysis and development; and
  Interagency coordination and collaboration.

Timeframe

The PASA was initiated on October 8, 1996, between the USDOE and the Philippine DOE, and this agreement is a continuation of that program. This PASA is due to expire in September 2006.

Funding

This PASA provides a burden-sharing arrangement for USAID to pay for transportation and expenses for USDOE experts to travel to the Philippines and provide technical assistance. USDOE pays the experts' salaries at no cost to USAID.

Program participants

The program participants include several divisions of the Philippine DOE involved in information technology, statistics, and data analysis; and the Philippine ERC commissioners and professional staff.

Contractors

The PASA was designed to provide energy expertise directly from USDOE staff. Because of the special requirements of the establishment of the Philippine ERC, a consultant group with

expertise in design, development, and operation of an independent energy regulatory agency was provided by the USDOE.

Accomplishments

The transition of the Philippine Energy Regulatory Board to the Energy Regulatory Commission moved smoothly with the technical assistance and institutional strengthening provided by the US DOE Consultants including: cost-of-service ratemaking in a competitive environment, unbundled rate case preparation, policy analysis, establishment of the ERC webpage and interagency coordination. The support provided by USDOE to the Philippine DOE led to improvements in the collection, analysis, and dissemination of energy data in the Philippines, and the DOE now provides the improved data and analysis in annual reports and on the DOE web page for wider access.

Monitoring Measurements

Indications that energy information systems had improved were visible in the diversified and more contemporary data presented in the annual DOE statistical report in addition to annual National Philippine Statistical Abstract. The range of documents, annual reports, technical analysis, statistical CD's in addition to discussions with professional agency staff, indicated a good understanding of the process of translating energy concepts and technical decisions to effective policy implementation. The consumers of the DOE and ERC products considered the new web based information resource an essential new portal for their operations. The basic institutional framework at the DOE and ERC is effective; however, the exposure of the professional staff to more advanced techniques could improve the value of these essential energy institutions.

Sustainability of Activities

The support provided by USDOE: Energy Information Administration, on improved information systems has remained the primary process for the collection, analysis, dissemination and projection of energy data in the Philippines by the DOE. However, the systems have improved and staff have changed, therefore, the process should be repeated periodically to insure technological compatibility.

The ERC is evolving into an essential organization for the adjudication of electric power and natural gas restructuring and the support provided by USDOE will ensure that ERC survives as a viable independent organization. The ERC technical staff will also require advanced training and technical assistance in the quantitative aspects of energy data analysis and forecasting to provide support for policy adjudication.

Potential Concerns or Problems

Valid data are essential for effective policy design and development. The successful collection, analysis, and dissemination of energy statistics and information are an essential component of policy development. It is crucial that the data and analysis provided for energy policy decisions reflect the state of the art methodologies. This is important to provide a valid basis for new energy initiatives and to assure potential private investors in the energy sector that risks are

defined and manageable. The Philippine ERC is evolving rapidly, and it is essential that the regulations being developed provide a framework for a competitive electricity and natural gas market to ensure that investments are made at an acceptable risk level.

Lessons Learned

Energy policy continues to evolve to suit changing technical, economic, and political conditions. The growing importance of restructuring of energy policy, including the electric power and natural gas sectors, required this PASA to help provide more contemporary tools to facilitate support operations. The diversified range of effective support provided can include: workshops, seminars, exchange of experts, web based courses and advanced training, depending on the specific topics and individuals involved in the technical exchange process.

Replication Potential

The approach used in this PASA to support deregulation of the electric power and natural gas industries can be used for other sectors, including telecommunications. The training and improved data and analysis concepts provided to the DOE staff can be used in other agencies and organizations to improve the process of statistical data collection and analysis.

Recommendations

The potential support to provide improved energy data and analysis systems at the DOE should be enhanced and expanded periodically. The professional staff, procedures, and technology change regularly, and it is essential that DOE have the state-of-the-art knowledge, procedures, and equipment. Continued support to the Philippine ERC is important to insure the institutional strengthening and capacity building is achieved. In addition, ERC staff requires training and technical support to improve their effectiveness. They must appreciate the concepts of energy supply and demand analysis, develop energy modeling expertise, and understand methodologies for competitive rate-setting. Additional support could provide training in financial and economic concepts, including cash flow methodology, rates of return, accumulation of capital, and rate setting. The effective understanding and use of these concepts will help attract investments essential to develop independent energy facilities. Technical and regulatory assistance for the pending natural gas and renewable energy legislation could be important. Additional areas in which the USDOE expertise could support the Philippine energy sector include training on the use of clean coal technology for indigenous coal and technical assistance for the DOE and National Oil Company to expand use of valuable indigenous geothermal resources for electric power.

PHILIPPINE ENERGY PARTNERSHIP PROGRAM

PEPP promotes partnerships between a Philippine energy utility or regulatory agency and a U.S. utility or regulatory agency. The U.S. Energy Association (USEA) has managed this program since 1991 and has operated it in more than 32 developing and transitional countries. The one-on-one expert pairings last for several years and provide a forum for a dialogue of experience as senior executives and managers go on working visits to each other's country. USEA has six other similar cooperative agreements with USAID. This program has been effective in providing an interactive dialogue between energy decision makers in the U.S. and the Philippines.

Purpose

The aim of PEPP is to promote an exchange of experiences and discussions between senior executives of U.S. and Philippine electric utilities and regulatory agencies. During the current period (February 1, 2003 to June 30, 2004), USEA plans to implement one partnership with the ERC and one with a Philippine energy company and will conduct an energy conference in Manila. The exchange of ideas between senior experts and managers from the United States and the Philippines has been mutually edifying. PEPP is also helping transform the ERC and electric utilities into autonomous, commercially oriented and efficient entities; ensuring the sustainable, environmentally sound supply, utilization, and regulation of electric power; and helping the Philippine power sector avoid and reduce greenhouse gas emissions.

Description

Both parties to the exchange agreement sign a memorandum of understanding committing, at the highest executive level, to develop and implement a work plan that focuses on issues identified by the Philippine partner and jointly schedule activities during the agreed timeframe. Each partner commits to attain specified results. The primary activities are business trips of 7–10 days in the United States and the Philippines by senior executives from each partner. These business trips focus on key issues and concerns agreed on in the work plan. The partnership program is designed to involve four to six executive exchange visits per year. One current PEPP, the partnership for the Energy Regulatory Commission, is being established between the ERC and a U.S. regional public utility commissions.

Activities

Seven activities are planned for the current PEPP:

- The first exchange occurred August 27–September 1, 2003.
- The second exchange occurred October 12–17, 2003, with ERC traveling to the PJM Interconnection, Ohio Public Utility Commission, and the U.S. Federal Regulatory Commission.
- The next trip will be from the N.J. Public Utility Commission to ERC in the Philippines. From Feb 16-18, 2004
- A new energy partnership with a Philippine utility met with PJM, MISO, and other U.S. organizations during Dec 2-4, 2003;
- A second trip is scheduled for February–March 2004 for PJM to meet in the Philippines.
- A third trip is scheduled for May 2004 with a U.S. ISO/RTO and a Philippine organization.
- An energy conference is scheduled for the summer or fall 2004 in the Philippines.

Timeframe

This program has been operating since June 1, 1998. The current period of operation is February 1, 2003 through June 30, 2004.

Funding

The level of participating funding for this program is $1,108,000 to June 2004. All participants are involved in this program on a pro-bono basis, although the travel and related expenses are compensated for participants.

Program participants

The program participants include USEA (United States Energy Association) and both the US based and Philippine based contributing electric utilities and regulatory agencies. The participants during this activity period include: USEA, ERC, PUCO, PJM, MISO and the FERC.

Contractors

The USEA is the only contractor and there are no subcontractors. Arrangements for exchange activities are made by the Program Manager: John Hammond, from the USEA, Washington, D.C., headquarters office.

Accomplishments

PPEP accomplishments include a number of successful exchanges between Philippine and U.S. entities including:

- Energy Regulatory Board, Manila, and the Minnesota Public Utilities Commission, St. Paul, Minnesota and New Mexico Public Utilities Commission, Santa Fe, New Mexico;
- Davio Light and Power, Davio, and American Electric Power, Columbus, Ohio;
- Iligan Light and Power Inc, Iligan City, and Sacramento Municipal Utility District, Sacramento, California, and Peninsula Light Co, Gig Harbor, Washington
- Visyan Electric Company, Cebu, and Portland General Electric, Portland, Oregon;
- Cagayan Electric Power & Light Co.and SMUD;
- National Power Co. and Georgia Power/Southern Company
- MARLCO and CSW
- ERC and the Ohio Public Utility Commission.

Monitoring Measurements

The program includes a questionnaire that is presented to each participant at the end of travel to assess the effectiveness of each exchange. This self-monitoring procedure serves to improve or change the program to address new or important concerns. The exchanges have been very positive for the participants, according to questionnaire response. The respondents indicated that: their partnerships had a positive impact on electric power planning and operations at their utility; they acquired learning mechanisms to monitor and evaluate distribution energy efficiencies; helped identify equipment that will determine energy loss; and was a technically and professional rewarding experience. Each program was monitored to support the achievement of USAID strategic objectives.

Sustainability of Activities

The relationships established through the partnership program continue well beyond the duration of the formal scheduled partnership arrangements. The partners have continued to share information through personal contact, web and correspondence and have independently funded additional visits. These expert peer contacts have proven to be an invaluable resource for addressing the technical, financial, operational and managerial questions that arise after the specific program ends.

Potential Concerns or Problems

Participants' responses on both sides indicate that the program has been successful. The need and time required for effective planning is a potential concern because providing a meaningful experience during the exchange requires careful selection and extensive arrangements. The identification and nomination of the Philippine energy group for the planned exchange program and date of the forum in 2004 has not occurred, and this delayed selection could impede the successful implementation of this program within the allotted timeframe. Recent concerns for personal security due to terrorist threats in the Philippines and anxiety about international travel could delay and interfere with some of the planned travel activities, although the security factor has not constrained current activities.

Lessons Learned

PEPP activities require detailed planning and careful selection of senior executives on both the U.S and Philippine sides to ensure a productive exchange. The process requires careful and continued nurturing to assure positive long term results.

Replication Potential

PEPP is based on a model developed by USEA for USAID and employed in 32 countries to facilitate exchanges of experts. USEA has established more than 80 partnerships under USAID auspices.

Recommendations

Many energy utilities and agencies have expressed interest in participating in this program. The current program is designed for senior managers, but could be expanded to include senior technical, financial, or operating experts, operators of the deregulated electric and natural gas networks and energy experts from the legislative branch. Future partnership activities could include: security issues; renewable resources; new technologies; marketing strategies related to energy efficiency, computer billing collection interfaces, and other topical issues. Funds could be allocated to permit additional partnership exchanges. The energy conference scheduled for summer/fall 2004 in Manila could focus on reliability, risk, and market reform in the electric power sector. It could also be a venue for dialogue among senior decision makers from the energy and electric power industries of Asia, the United States, and Europe. DOE could host and USAID/Manila could support the conference in conjunction with the Manila based Asian Development Bank. The conference should be guided by a carefully structured agenda.

UNITED STATES - ASIA ENVIRONMENTAL PARTNERSHIP (AEP)

The US-AEP is a global USAID program prompted by heightened awareness of environmental degradation in Asian countries and their need for assistance in sustainable environmental management for economic development. The program has been active in the Philippines since 1991 to mobilize public and private sector resources and is designed to match Asian environmental needs with U.S. environmental experience, technology, and practices. The US-AEP program in its current form promotes clean and environmentally efficient cities and industries. Since its inception the program has provided technical and training assistance to 10 Asian countries. Currently, the program is active in five countries: Philippines, Vietnam, India, Sri Lanka, and Indonesia. US-AEP Regulatory Dialogue Program also assists lawmakers and NGO's develop and implement government regulatory and public participation programs related to the environmental.

Purpose

The objective of US-AEP is to promote cleaner and more efficient cities and industries in Asia by disseminating U.S. environmental technologies and practices through training, technical assistance, and facilitating partnerships. The program achieves its goals by helping Asian countries improve air and water quality; finding ways to make energy use cleaner and more efficient, and improving solid and toxic waste management. By creating partnerships that support the exchange of best practices and technology in developing Asian countries US-AEP is designed to reduce the environmental impacts of rapid growth, improves Asian countries' ability to create and enforce environmental policies, increases industrial efficiency, and reduces waste. US-AEP has somewhat limited relevance to USAID's ECAP, however, because it focuses on industrial environmental issues.

Description

The strategy of this program is to contribute directly to USAID/Philippines' SO4, "Productive, life-sustaining natural resources." The potential activities complement the SO4's two intermediate results areas: improved environmental governance and improved air quality. The program objectives in the Philippines include facilitating long-term environmentally focused American–Philippine partnerships among national and local governments, NGOs, and academic and industrial environmental management experts. In addition, US-AEP helps leverage other donors' resources, particularly those of the Asian Development Bank (ADB) and the World Bank.

Activities

US-AEP has no set activities. It provides technical assistance and training based on scopes of work defined by the host country and US-AEP program directives. Exchanges can take a variety of forms, including US - Philippine, and third-country exchanges. The costs associated with these exchanges are limited to a maximum of 30 percent of total costs for a given year. In FY04 US-AEP will work with the Partnership for Clean Air and other NGO's to develop a public information campaign designed to publicize the negative health effects of air pollution. For 2004, the program will include initiatives to improve environmental governance, reduce environmental impacts, and improve resource efficiency and management. It will also continue the

Environmental Exchange Program, which conducts seminars, workshops, and conferences for participants from government, industry, and other stakeholders.

Timeframe

September 2001–September 2004.

Funding

Global funding total approximately $31 million for two base years—$15 million for the International Institute of Education (IIE) and $15.9 million for Louis Berger International.

Participants

The participants include Philippine governmental institutions, NGO's, community-based organizations, and others are engaged in environmental management. The US participants include:

- U.S. Environmental Protection Agency;
- Alliance to Save Energy, USA;
- The Asia Foundation;
- International City/County Management Association, USA.

Contractors

In addition to IIE (training) and Louis Berger Group (technical support services). Planning and Development Collaborative International provides services related to urban issues.

Accomplishments

Energy or energy-related activities include:

- The Energy Efficiency Program, in partnership with U.S.-based Alliance to Save Energy, created two associations—Energy Efficiency Development Alliance and the Energy Conservation Entrepreneurs Association—as platforms for energy efficiency business and other activities;
- Study tours and related activities that will reduce tricycle emissions in three local governments;
- Dissemination of health pollution information with the Environmental Broadcasters Circle and Partnership for Clean Air to increase public awareness;
- "Watergy" Municipal Energy Efficiency Projects in the Philippines. In partnership with Alliance to Save Energy, an automated energy monitoring protocol to save energy.
- During the current contract period, each of the two US-AEP contractors and their partners completed technical exchanges and assisted in developing U.S.–Philippine partnerships.
- The technical support helped the Partnership for Clean Air design the Philippines government campaign to eliminate lead from gasoline.
- US-AEP, in collaboration with DOE, supported a speaker on natural gas, resulting in a comprehensive report of recommendations for compressed natural gas development.

Monitoring Measurements

The Exchange Program for Sustainable Growth evaluates the program. It uses post-exchange questionnaires so participants can assess changes in their environmental knowledge, attitudes, and practices. Telephones calls to U.S. participants can assess their satisfaction with the exchange; determine what participants learned, and gather information about the results. The Exchange Program for Sustainable Growth also contacts participants three to six months after each exchange. Similar evaluations may also be included for technical services activities.

Sustainability of Activities

Sustainability of activities depends on the absorptive capacity of the host country governments and subsequent action taken by them. Financially, the program uses cost sharing approach and it has been successful in keeping within budget.

Potential Concerns and Problems

The program is managed from Washington, D.C. Its location could add significantly to travel and management costs. Also, given the breadth of environmental issues, US-AEP has very wide coverage and is spread thin.

Lessons Learned

US-AEP has maintained an environmental focus for the program.

Replication Potential

US-AEP has provided successful replication in other Asian countries.

Recommendations

Although the focus of the US AEP is the environment, the energy related activities can be included in a carefully designed action. In the context of development, energy-environmental issues are often interlinked. Most of US-AEP's past and planned activities relate to industrial environmental concerns. However, the ECAP can still benefit from this program because of the extensive experience in the Philippines (and other Asian countries) can be a potential resource. Specific activities such as training and technical assistance can be adjusted to meet the specific energy related environmental requirements.

CLIMATE CHANGE INFORMATION CENTER

The Manila Observatory began as an earthquake observation and monitoring station in 1880. In 1901, the U.S. colonial government designated it the Philippine Weather Bureau. Given its tradition of excellence in science and research, the Bureau sees itself as a partner in addressing global warming, emissions, clean air, and urban development. Through its support of the Climate Change Information Center (CCIC), USAID/Manila has made the observatory a focal point for scientific research and dissemination of information on global climate change, greenhouse gas emissions, and related topics. The observatory has six programs on climate change and air quality. The Climate Change Assistance Program is financed almost entirely by USAID, and the

Urban Air Quality Program is partially financed by USAID. The CCIC has a wing in the Manila Observatory, a staff of 10-12, and an active website, www.klim.ph.

Purpose and Description

The purpose of the CCIC is to be a clearinghouse for local, national, and international climate change data and information; raise public awareness through briefings, exhibits, and publications; provide training on climate change science; and provide technical assistance on related topics. It consists of two major programs: the Development Capacities Program and the Integrated Environmental Strategies Philippines Program.

Activities

- The ***Development Capacities Program*** is developing capacity for climate change initiatives in the Philippines and East Asia through information, education, and communication; technical assistance; and institutional development. It conveys scientific information and knowledge on climate change to the public.
- The ***Integrated Environmental Strategies (IES)*** program in the Philippines started in February 2003. It provides policymakers and other stakeholders with quantified data on health, environmental, and economic impacts of measures in the transportation sector and builds capacity for integrated policy analysis. IES has been concentrating on a cost-benefit analysis of alternative mitigation measures to reduce emissions from the transportation sector in metro Manila. The program will work with stakeholders in metro Manila to identify integrated air quality/greenhouse gas mitigation measures in the transportation sector.

Funding

By the end of 2003, USAID/Philippines will have provided US$403,000. Funding beyond 2003 is estimated at $193,000.

Participants

CCIC regular staff of 10; subcontracted consultants; policymakers and other stakeholders (e.g., tricycle operators). The Manila Observatory manages IES Philippines with funding from USAID/Manila, National Renewable Energy Laboratory, and the U.S. Environmental Protection Agency.

Contractors

Subcontractors for the cost/benefit analysis included Dr. Ronald Subida, Dr. Desiree Narvaez, Liza Andres, Karl Vergel, Dr. Eman Anglo, and Dr. Roberto Yap.

Accomplishments

Workshops, briefings, books, videos, interactive CD-ROMs, maps, climate change primers, flyers, posters, brochures, and briefing kits. *Disturbing Climate*, edited by Jose T. Willarin, DJ,

received the 2001 National Book Award (Sciences) and the 2002 Best Book in Science and Technology.

Monitoring Measures

The Manila Observatory has been submitting proposals to the USAID/Manila for each component of its work. Each proposal included a workplan, list of activities, a schedule, manpower estimates. USAID/Manila monitor CCIC expenditures and performance.

Sustainability of Activities

On the basis of historical evidence and the quality of current staff, we believe that the CCIC is sustainable professionally. In fact, given its academic prestige, the CCIC should become a regional center for Southeast Asia. The CCIC has been funded almost entirely by USAID/Manila. As a non-profit academic research institution, the CCIC cannot sell most of its products (except maps and surveys). It cannot charge directly teachers and motorcycle operators for workshops and training; nor is it likely that it can charge government agencies for training programs. Even so, such charges could not sustain it. Sustainability will require new financing by various donor organizations and national government agencies.

Potential Concerns and Problems

- ***Workshops are not reaching enough people.*** Only about 500 people attended workshops between January 2000-September 2003. Two workshops for high-school teachers attracted only 40 people. A workshop for motorcycle (tricycle) operators included only a small group of these stakeholders. And most training is focused on Metro Manila. The direct cost for "publications, IEC activities and meetings" was about US$ 30,000; direct "labor costs" was about US$ 90,000. These figures imply an average direct cost of about US$ 240 per trainee (not including indirect costs of "overhead" "institutional development activities").
- ***Data are limited and in short supply.*** Data on transportation and emissions are limited and existing data are somewhat unreliable. The cost/benefit study of the IES is using data from the early and the mid-1990s.

Lesson Learned

Investment in the CCIC has created a credible, independent institution that monitors and facilitates adaptation of the Clean Air Act outside the government apparatus. The selection of the Manila Observatory as the home of the CCIC has been justified. The dissemination of information and out-reach programs, however, have not yet reached enough people to create a critical mass for a change. In its own self-assessment the CCIC indicated that it needs to provide more training, use teachers to convey knowledge on climate change, develop materials that showcase the Philippines and Asia, improve the kalima website, and extend IEC activities beyond Metro Manila.

Replication Potential

The success of the CCIC is largely attributable to its being housed in a reputable institution with a long history of studying climatic change independent of outside direction. The center could be replicated in other academic institutions. Similar programs, however, should concentrate on locations outside of Manila. Air pollution is a problem in all urban areas (and in some areas, problems are more severe than in Manila). To address issues associated with the Clean Air Act outside of Manila, the center could be replicated in a university in a provincial city. The university should be reputable and have the necessary credentials to nurture a center.

Recommendations

Secure Continuous USAID Funding

In a fairly brief period of full operations, CCIC has achieved goals set by USAID/Philippines. USAID/ Manila should continue funding the CCIC at least until the end of DevCap II (September 2005). The center should explore additional funding by U.S. Government agencies (EPA, DOE, NASA) and international agencies (World Bank, ADB, Global Environmental Fund) for specific research. Such agencies, however, need to fund specific tasks, not general dependence.

Secure Multilateral Funding

To make CCIC sustainable, continuous funding by the USAID should be contingent on additional funding from others. CCIC has already contacted the Japanese Ministry of Transport; and the ADB, with its forthcoming program for Clean Air in Asian Cities, is a potential donor. Additional sources could be related US Government agencies including. EPA, DOE, and NASA, and international agencies, such as WHO and UN agencies involved in urban development and atmospheric research. Philippine ministries include the DENR, the Department of Transportation and Communication, the DOE, and the Department of Health. After the initial investment by USAID/Manila, the ministries should provide at least partial support.

Improve Training and Reach a Wider Audience

Workshops have reached only 500 individuals, including 40 teachers and a group of motorcycle (tricycle) operators. Most training has focused on residents of Metro Manila. To make the educational and training programs more effective, CCIC should:

- Conduct more sessions (at least 2 per week) for more participants, especially more sessions for teachers
- Develop more materials that showcase the Philippines and Asia
- Provide multimedia training (CDs, videos, TV, radio, billboard sites).
- Make environmental issues related to climate change and energy a part of high school and college curricula and have the curricula require teacher training provided by the Manila Observatory.
- Provide an annual regional forum for discussion of GCC, under the purview of the Manila Observatory. Annual conferences are good venues for meetings experts. USAID/Manila could sponsor planning for a first conference.

- Continuously improve and update the kalima website.
- Conducting larger sessions of perhaps 100 could reduce cost per trainee.

Create Statistical Unit

A Statistical Unit could handle data on climate change, emissions, transportation, and related socioeconomic characteristics. The unit will collect, verify, and update data, mainly from secondary sources such as the Census Bureau, the DENR, Department of Transportation and Communication, and DOH. It could also provide daily and hourly information on air quality in metro Manila by establishing test stations at several locations. This can provide for longitudinal and transverse profiles for climate modeling. The unit could also be a focal point for an interagency steering committee on special surveys, such as household surveys. The unit could easily employ six permanent staff. New funding by USAID/Philippines could finance the unit initially. The unit could use low wage, highly motivated graduate students as analysts.

Become a Regional Climatic Center

The CCIC should become a regional center, perhaps changing its name to Climatic Change Center. This new orientation could attract co-financing from international organizations concerned with climatic change.

ENERGY EFFICIENCY PROGRAM

To meet USAID's Strategic Objective 5, the Energy Efficiency Program [EEP] promotes energy efficiency in commercial buildings that use significant amounts of electricity (e.g., hotels, hospitals, apartment buildings, office buildings). During project implementation, the Philippine government restructured the energy sector, passing the Electric Power Industry Reform Act (RA 9136, June 2001). The government's focus shifted to a competitive market that would encourage the private sector to reduce energy requirements in commercial buildings. USAID restructured its strategic objectives, and improving energy efficiency was a component of SO4 under "Improved performance in energy and air quality."

Purpose

The purpose of the EEP, Phase One was to reduce greenhouse gas emissions and improve air quality by using public information and media campaigns to convince building owners of the potential savings in energy and money they would realize if they invested in more energy-efficient technologies. Phase Two used a pilot program to demonstrate the effectiveness of using private energy service companies [ESCO] on performance-based contracts to realize energy efficiencies.

Description

Activities

- Phase One
  - Conduct media campaigns to persuade the local trades and building community about the importance of energy efficiency.

- Promote energy conservation by organizing regular stakeholder meetings and auditing facilities and collecting and analyzing data from partner facilities
- Organize training courses and workshops in addition to one-on-one and client-specific informal sessions.
- Conduct audits and walk-through surveys for 20 potential project participants and six corporate partners to demonstrate potential savings.

- Phase Two
  - Identify sites for project demonstration
  - Select energy service company to conduct energy audit and help find information on energy products and services
  - Provide assistance to building owner in negotiating and processing carbon credit trading

Timeframe

August 1999–September 2002.

Funding

USAID/Manila contributed $471,200 for the period August 1999–December 2000. US-AEP provided $20,000 for April–September 2001. USAID Washington contributed $175,000 for the program for October 2001–September 2002.

Program participants

- Private sector building firms such as property management corporations, land companies, building owners, hotels, shopping centers, industrial buildings, and factories
- More than 30 organizations for Phase 1, including the DOE, Department of Environment and Natural Resources, Asian Development Bank, and NGOs such as Earth Day 2000 Network, and the Philippine Climate Change Information Center
- Phase Two, ESCO Honeywell Systems (Thailand), Ltd.
- Professional organizations, including the University of the Philippines and the Energy Management Association of the Philippines.
- Companies that expressed interest in the energy service company concept—CESTCO, CPI Energy, JONROCH, TRANE Phil and GNQ Industrial Corporation (CETSCO was selected for the pilot).
- Government buildings, hospitals, hotels, industrial buildings, office buildings, and retail establishments that expressed the intention to undertake efficiency improvements.

Contractors

Both phases of the project were directed by Nexant Inc., the primary contractor, and implemented by IIEC under subcontract.

Accomplishments

Twelve corporate participants committed to instituting energy efficiencies in their buildings under Phase One, the Green Buildings Program:

- Tower One Exchange Plaza (35 stories)
- Makati Stock Exchange (8 stories)
- Fort Bonifacio Development Corporation Building E
- City Sports Club in Cebu
- Ayala Life FGU Center in Cebu
- Festival Supermall
- New Building Construction in SLEX
- Pink Patio Resort
- McDonald Free Standing Store
- Multinational Bancorporation Centre
- Shemberg Corporation
- University San Carlos Technology Center

During Phase One, three workshops were held for the staff of participating organizations:

- Two-day energy efficiency project development workshop with 32 participants in Pasig City
- Two-day energy efficiency project development workshop with 24 participants in Pasig City
- Three-day building energy simulation training seminar with 19 participants in Quezon City.

Six buildings had completed their investments by the end of Phase 1 in 2000. Over the life of the project (10 years), assuming only the six firms completed energy-efficiency improvements, the project contributed to 1.6 MWh of annual energy savings and reduced carbon emissions by 9.8 metric tons. If all 12 buildings completed project improvements, energy savings are estimated at 2 MWh annually, with carbon emissions reductions of 12.0 kilo tones. (The methodology for measuring and verifying the impacts is described in Annex J of the final project report).

In Phase Two, 14 site visits were conducted to identify energy efficiency program participants, including government buildings, hospitals, hotels, industrial buildings, office buildings and retail establishments. Building sites that expressed interest in the program were Waterfront Cebu City Hotel (Cebu), PLDT Exchanges (Cebu), Gaiano City Mall (Cagayan De Oro City), and Cebu Plaza Hotel.

Monitoring Measurements

IIEC developed a monitoring and evaluation methodology for converting energy savings into avoided greenhouse gas emissions. The calculated energy savings equaled the baseline energy usage minus the post-installation energy use. Protocols using international performance measurement and verification procedures were applied to each facility. U.S. EPA conservation verification protocols and U.S. Federal Energy Management Program guidelines were applied. Greenhouse gas emissions software using ICLEI analyses greenhouse gas emissions were applied. The training evaluations relied on the participants responses to questionnaires about the usefulness of the workshops and the potential benefits received. There was no monitoring

mechanism in Phase Two but it was proposed that the next phase of project execution would establish a savings verification protocol to monitor and evaluate the new energy service company projects.

Sustainability of Activities

The program appears unsustainable because construction building managers appear not to accept the energy service company concept under the current conditions in the Philippines. The program has made the building community aware of the importance of energy efficiency, but without widespread acceptance of the need to invest in retrofitting facilities. The initial information aim of the program has been reached, so the Philippine government, private sector, and institutional groups in the building community should support energy efficiency initiatives. The project's momentum cannot be carried forward without an agreement for conducting the financial audit necessary to validate the project engineering assumptions. However, the economic decline of the building sector may affect such efforts. Energy efficiency is a part of new building design, but owners of old buildings that require retrofitting are not currently prepared to make this investment. This makes the sustainability of the Green Building Program unlikely.

Potential Concerns or Problems

Some potential participants, especially small and medium-sized building owners, indicated that they could not afford efficiency upgrades, and the program could not provide funds for them. Marginal firms cannot make large capital expenditures in times of economic duress. IIEC was unable to penetrate a large diverse group of building structures occupied by hospitals, hotels, food markets, mega malls and others buildings. Regionally the marketing aspects of this program focused mainly in Metro Manila instead of approaching facilities in other parts of the Philippines. Participants (builders) involved in the building design and development of properties need a more integrative design approach to institutionalize and sustain energy efficiency. Information on cost competitive energy-efficient technologies on the market is scarce. Phase Two had only a one-year commitment, and a long-term commitment was required to achieve energy savings and program objectives.

Lessons Learned

Bringing energy efficiency into building structures requires time. Potential strategies learned from the program include:

1. Take a top-down approach in recruiting program participants.
2. Consider the business cycle when promoting capital-intensive projects.
3. Marketing energy-efficient projects requires internal selling to the decision makers.
4. Acting as an honest broker, IIEC was able to unify groups to meet the common goals. The collaborative process of showing how to save money and save energy worked with all stakeholders.
5. Involving all the diverse components in the building and energy sector and creating a group dynamic was successful.

Lessons learned from Phase Two are:

1. The program made the commercial building sector aware of the benefits of energy efficiency.

2. Performance-based contracting, a new concept among commercial building owners, was resisted. Owners remained hesitant to venture into energy-efficient investments for contracting.
3. Owners were not persuaded by the "no capital outlay" and low–risk or no-risk benefits of the energy service company concept.
4. Negotiations for lease financing of contracts were delayed by the question of who would bankroll the energy service companies.
5. Short project timeframe hindered the pilot projects.

Replication Potential

Realizing energy savings remains important to both the government and private sector. Replication to an expanded building community (including shopping centers, high-rise apartment buildings, etc.) could enable expanding the Green Buildings Program throughout the Philippines after of Phase Two. Increasing support for conservation in buildings will be required as new energy policy initiatives are developed. A number of the national issues could be replicated on an island or local basis. In sum, there is no support to expand or continue the Green Building Program.

Recommendations

During periods of economic downturns, the interest of the private sector in energy efficiency wavers. Only a long-term campaign might be able to persuade companies to use profits to improve energy efficiency. The energy service company concept has been successful in the United States and Eastern Europe, due to the need for buildings to maintain a habitable living environment under extreme external temperature conditions. In the Philippines, however, the only concern is for AC to compensate for high external temperatures, not a strong heating component, and builders seek the least cost forms of construction. The private sector will be an important factor in introducing energy savings to the building sector and continued support, assistance and legislation from DOE and DENR is encouraged. A generic recommendation is that USAID should consider suspending future support for the Green Building Program unless demonstration projects can be financially viable within a five year period.

3. DIAGNOSIS OF ECA OPERATIONS

To achieve the objectives of its Energy and Clean Air Program, USAID has been dependent on a multitude of projects implemented by technical assistance contractors and their support sub-contractors, interagency agreements, cooperatives, and grants. Managing the variety of contractors and initiatives in the context of a changing energy and environment policy perspective, including the Electric Power Industry Reform Act (EPIRA) has been challenging. In this section we plan to evaluate the institutional mechanisms and working relationship between USAID and contractors under the ECA Program and offer recommendations for improving the program operations. In arriving at these recommendations, we held discussions with the key ECA project staff, including AMORE and EETP, to understand their relationship with USAID the Government Agencies, NGO's and their organizational performance.

WORKING RELATIONSHIP BETWEEN USAID AND CONTRACTORS

Given the diverse range of projects under ECA, the amount of time and attention that USAID/Manila staff can devote to monitoring and assessing specific project performance is a potential issue. We found that project managers were "very satisfied" that USAID-OEM has worked closely and that USAID has paid attention to the contractor's implementation of tasks under the IQC. The OEM team recognized constraints and barriers caused by the need to work in a limited time frame while requiring each task to achieve positive results. When issues arise at USAID that require immediate attention from the contractors, all recognize that scheduled work tasks must be adjusted and that planned activities may not be completed on time. USAID and contractors have adjusted to periodic "crises" and to emergent needs of the OEM staff and task managers have been flexible. Although there are period of short response tasks blended with longer term projects USAID and its contractors appear to enjoy excellent relationships.

Communication, Coordination, and Collaboration

The positive flow of information between projects and between each project and USAID and the final client is important. That flow is especially good between USAID and DOE. Communication is very important on the AMORE project, which must ensure steady contact between headquarters, regional offices, and barangays in Mindanao. To ensure this communication, the project established a satellite phone system through SMART communications. Discussions with the contractors indicate that USAID mission needs and reporting requirements as indicated in the terms of reference are being met. Reports are submitted to the Mission on time and are accurate descriptions of activities. When possible, USAID staff participates in critical events.

To ensure effective inter-project communication, scheduled monthly meetings should be maintained with USAID and summaries of events should be emailed to all project participants and contractors. A web-based portal would help raise awareness of all activities and disseminate the best practices and lessons learned. In addition, a periodic newsletter detailing the current and perspective Mission and contractor activity in the energy and clean air sector would be useful not only to USAID/Manila and Washington, but also to all contractors, the public, and the energy and development community.

Energy and Clean Air Portal

The lack of information about DOE program activities as they relate to contractors is an issue. This observation does not discount the value of the present flow of information between USAID and contractors, but recognizes the importance of web-based portals to modern management practices. For example, AMORE has launched a new project website, and AED will soon be launching its own website. This sort of activity should be encouraged. Under the "environment" link of USAID/Manila's website is a short description of ECA activities and a link to individual projects, but only the authorized USAID staff is able to access these links. This frustrates others who are seeking information on the ECA program.

A potential solution, when looking ahead to SO4 program activities, is to have a new ECA website on the USAID portal that links to government websites (e.g., DOE, DENR) as well as the sites of AMORE, AED, and other projects and contractors. This sort of website would benefit

all parties in the Philippines as well as interested parties in other countries around the world. The website of ECA programs should include more about activities, energy and clean air best practices, and lessons learned from experiences in Manila and other USAID missions, as well as links to other international donor energy projects. Links and accessible study results could also be posted on this web site. The approval of the USAID contract manager may be required before entire reports can be posted, but executive summaries should be posted as soon as possible. Such a web portal can be helpful to all institutions involved in energy and clean air. In addition, Internet-based technology may offer an opportunity to monitor projects by having contractor activities posted on a portal dedicated to strategic objectives.

Project Functions: Dividing Training and Policy Development

Energy, environment and economic development policy are dynamic and will change to suit new political, economic, technical and financial constraints. USAID has used the IQC mechanism to have contractors conduct some tasks that were not considered important when the ECA program was conceptualized. The Energy Environment Training Program (EETP), for example, now has several components covering diverse sectors of policy and training programs (e.g., policy review and assessment of energy sector, vehicle emissions, development of natural gas and renewable energy sector). Technical and managerial training, communication, and outreach focus on the public and private sectors. With such a large portfolio of activities, the EETP had to revise its work plan continually in order to meet the Mission's critical needs. To avoid overload, future contract activities could split the IQC, with one part focusing on training and the other on policy matters. Such a division could have implications for costs but would help ensure that ECA objectives are met. Flexible prioritization of tasks is also important by both USAID and the contractors.

Project Training

Training, the effective transfer of knowledge, is an essential process that facilitates the utilization of more advanced techniques and methods to improve institutional performance. Each project needs to assess the cost-effectiveness of training on a topic and individual basis. Before conducting a training course, contractors should consider how it will build institutional and individual capacities and its short- and long-term benefits. The total cost of training per individual should be evaluated. After the training module has been designed and developed it can then be replicated for a wider audience at a lower cost per individual trained. A process should be developed to evaluate the effectiveness of training and the impact on improved work or more advanced tasks by each individual.

Institutional Framework for Vehicle Emission Testing

Annual registration of vehicles in the Philippines requires passing emissions tests conducted by private emission testing centers (PETC) and government facilities operated by the Land Transport Office. The purpose of PETCs is to provide infrastructure for nationwide emission testing without placing a financial burden on the government, which has neither the facilities nor the expertise to implement such a program. Instead, the government sets standards and manages the program. Four government agencies certify and monitor PETCs as follows:

- Department of Transport and Communication (DOTC), Land Transport Office–issues authority to conduct emission tests
- Department of Trade and Industry (DTI)–issues license to conduct business.
- Department of Environment and Natural Resources–issues certificate for testing equipment.
- TESTA—Only Company certified to train and issue certificates for emission test technicians.

There are potential conflicts concerning the legal, technical and institutional requirements of each agency. The coordination and responsibilities of these agencies needs to be reviewed in order to arrive at alternatives that clearly delineate authority and responsibility. It is suggested that this essential process of defining, testing and regulating vehicle emissions be codified in the legal structure. All motorized vehicles, including motorized tricycles, jeepneys, buses, trucks should be included in the new testing program and stringent, non evasive standards should be promulgated.

Recommendations

In order to improve the operating functions of the contractors, USAID/Manila should consider:

- Strengthening the ECA web portal or designing and operating a new ECA portal,
- Developing and maintaining websites with links to the USAID website,
- Supporting an institutional study of the potential overlapping authority among government agencies involved in emissions testing,
- Splitting future IQCs into separate policy development and training components, and
- Supporting a contractor review of the long-term impact of education and training provided to the USAID clients, including agencies of GRP, including sustainability aspects.

4. PROGNOSTIC ANALYSIS

In this section we describe new activities and initiatives that USAID should consider supporting during the mid-term period under the objectives of the Energy and Clean Air Program.

SUPPORT DEVOLUTION OF ELECTRIC POWER INDUSTRY

The restructuring of the electric power sector is intended to improve the efficiency of electric power delivery using competitive market concepts. New entities (ERC, TRANSCO, PSALM) require support to ensure that a sound framework for an improved electric power system is created and implemented.

Participants: DOE, ERC, TRANSCO, PSALM

Tasks

- Provide technical assistance to organizations (e.g., ERC, TRANSCO, PSALM) concentrating on successful aspects of the U.S. electric power restructuring.

- Support TRANSCO development to ensure that transmission functions of the NPC are appropriately planned, operated, and financed.

Results

A more efficient electric power structure will provide power to consumers more effectively at a lower cost, and at a lower risk of curtailments.

EXPAND NEW AND RENEWABLE ENERGY TECHNOLOGIES IN RURAL AREAS

About twenty percent of the population of the Philippines, primarily in rural areas, is not currently served by the planned growth in electrification. For financial and technical reasons many rural communities are not connected to the grid; although, small-scale renewable energy systems could provide electricity to these communities. One possible solution is to commercialize large-scale grid-connected and small-scale off-grid applications for renewable technologies through a public–private initiative.

Participants: DOE, NEA, LBP, NEDA, NPC

Tasks

- Review the current and prospective situation for large-scale grid-connected wind-based electric power generation that can be financed commercially, based on wind-mapping data from CCIC. The potential for matching wind projects with pumped storage hydro projects is good.
- Analyze alternative funding mechanisms and utilization arrangements to arrive at competitive approaches for including renewable energy power purchase agreements to compensate for high initial investment costs. Restructuring the power sector could have negative effects on renewable energy facilities because payments would be made on plant availability and marginal cost of energy, and renewable facilities may not receive capacity payments under power pool arrangements.
- Evaluate potential for renewable energy technologies (e.g., photovoltaic, micro-hydro, wind power, micro-geothermal, diesel, bioenergy) supplying half the off-grid electric power market.
- Assess the use, maintenance, and battery replacement necessary for photovoltaic distributed small-scale systems. The replication of such systems for residential and community activities—water pumping, lighting, refrigeration, telecommunication—is commercially available.
- Explore the possibility of the “O Ilaw” rural electrification program, which is aiming for total electrification, providing renewable sources as the least-cost option for many remote and underserved locations.
- Explore opportunities for renewable energy technology investment available through multilateral development banks, bilateral development agencies, and NGOs that are expanding funding for such investment as part of rural agriculture, governance, health, and urban transport projects.

Results

Expanded use of available renewable energy technologies on a grid and off-grid network will help electrify rural and remote island locations on a viable technological and financial basis.

INCREASE USE OF NATURAL GAS

Natural gas resources can provide clean energy to meet electric power, industrial, commercial, residential, and transportation requirements. The extensive natural gas resources at Malampaya, and the potential for additional indigenous resources, offers an opportunity to use this clean fuel in many sectors of the economy.

Participants: DOE, ERC, NPC, Petronas, Shell

Tasks

- Analyze logistics, safety, operational, and funding options for supply stations in Metro Manila. Natural gas can provide clean fuel for the transport sector and help reduce pollution in Metro Manila. A fleet of publicly supported vehicles, including buses, can provide a means for testing natural gas use for a trial period.
- Provide technical assistance to assess the market for gas facilities to meet industrial, commercial, and residential requirements (e.g., a dedicated energy park using natural gas for all energy requirements).
- Assess factors affecting infrastructure for natural gas power plants. The expanded requirement for electric power in and around Luzon could require more gas-powered electric facilities.

Results

Greater use of natural gas to meet electric power, industrial, commercial, residential, and transportation requirements will improve the energy situation in the Philippines.

REDUCE VEHICLE EMISSIONS

The air quality in the Metro Manila region is considered hazardous to the health of residents due primarily to vehicle emissions. The unregulated vehicle emissions in urban areas, particularly in the Metro Manila area can be reduced by (1) making anti-smoke belching enforcement units more effective, (2) creating a statistical unit to collect and analyze air quality, and (3) reducing emissions from motorcycles and motorized tricycles.

MAKE ANTI-SMOKE BELCHING ENFORCEMENT UNITS MORE EFFECTIVE

Anti-smoke belching enforcement units stop, ticket, and sometimes impound offending vehicles. In Manila, the major belchers are Jeepneys and buses powered by poorly maintained diesel engines that emit particulate matter. More than 75 percent of motorized tricycles, which are powered by 2-stroke engines, release 15-40 percent of their fuel air mixture. Because enforcement units concentrate on thoroughfares, where tricycles are forbidden, they apprehend mostly Jeepneys, buses, and other utility vehicles.

In metro Manila, units focus on EDSA, the main traffic street. The DENR and the DOTC established the anti-smoke belching unit in 2000. The Metropolitan Manila Development Authority (MMDA) was to manage roadside apprehension in Metro Manila. The original plan called for 22 units with all members deputized by the LTO. Equipment was purchased and financed in part by an ADB loan—metro Manila Air Quality Sector Program. The MMDA was to manage five units, focusing on EDSA Street and the heart of metro Manila. Local government units (LGU) in Manila were to operate the remaining units. All were to report to the LTO, which maintains a database on offenders, collect fines, and impounds vehicles of repeat offenders. The DOTC was to establish its own enforcement units nationwide, with some operating in Metro Manila.

At present, only three enforcement units are operating five times per week in metro Manila. One unit operated by the MMDA consists of 26 office managers and support staff and 13 on-the-road staff operating two testing units. Another unit operated by the DOTC consists of 10 on-the-road staff operating two testing units. The third unit is operated by Bantay-Kalikasan, an NGO financed by a grant from the Government of Finland. It includes eight on-the-road staff, operating one testing unit. This is the only LGU deputized by the LTO.

What happened? At the beginning of the program the MMDA operated 5 units, but eventually cut to only one unit, which now seems overstaffed. Its on-the-road unit is twice as large as the DOTC unit. The LGUs, claiming lack of resources and manpower, declined to participate. If they could have received some revenues from fines they might have participated. At present, they do not receive any funding from the LTO or the MMDA to conduct these activities. Also claiming lack of resources, the DOTC operates only one unit in Metro Manila, mainly on EDSA. Bantay-Kalikasan has been operating with financial support from Finland. It is not sustainable, and may cease to operate when Finnish support is exhausted. Each functioning unit reports apprehending 80-100 violators per day. About 75 percent of the vehicles stopped at random do not pass the road test. The LTO reported 27,095 apprehensions in 2002. The penalty for a first offense is PhP 1,000; for a second, PhP 3,000; and for a third, PhP 5,000 and impounding the vehicle, although impounding is very rare.

On September 27, 2003, a coalition lead by the DENR started a three-month campaign “Smoke-Free EDSA.” This campaign calls for more stringent enforcement on EDSA. But, given limited resources, significantly better enforcement is doubtful.

Participant: DENR, MOTC/LTO, MMDA, 17 LGOs, and NGOs, such as the Bantay-Kalikasan.

Tasks

At minimum, reactivate the originally planned 22 enforcement units. Equipment for the 17 LGUs and MMDA has been procured and is supposedly available. But financial resources, manpower, and the will to activate the enforcement units is lacking. The success of Bantay-Kalikasan indicates one way of overcoming the impasse. NGOs concerned about clean air can become more active, operating enforcement units on behalf of LGUs. This will increase the number of participants and public awareness. Transferring some of the fines collected by each LGU back to the LGU can help finance operations.

Results

Study reactivating the 22 enforcement units; using NGOs as enforcement units in each LGU and metro Manila; long-term means for financing LGU units and ensuring their financial sustainability; reviewing operational procedures of existing units to improve efficiency; and improving the database of the LTO to catch and apprehend and, if necessary, destroy vehicles of repeated offenders.

CREATE STATISTICAL UNIT

Evaluating changes in emission levels requires continuous collection and maintenance of reliable data. At present, data on transportation and emissions are limited, sketchy, non-continuous, and unreliable. For example, the study evaluating the impact of emissions on health, financed by the USAID and conducted at the Manila Observatory is using data from the early and mid-1990s. Governmental units such as the DOTC, LTO, and the DENR collect data on transport and emission, but their databases are not integrated and lack time-series data to evaluate progress. A statistical and data collection unit is needed to act as a clearinghouse for data on emissions, transportation, and related demographic and land-use characteristics (e.g., population and household composition and travel habits).

Participants: The Manila Observatory has been collecting data on atmospheric and climatic changes since the end of the 19th century and is the only institution that has been collecting continuous data on emissions in Metro Manila (at one station). The role of its Climate Change Information Center (CCIC), financed by the USAID, should be expanded so it can be a clearinghouse for such data. Other participants include the DOTC, LTO and the DENR, and ETI, the private monitoring station operator. The first two private monitoring stations in Metro Manila started operating at the end of September 2003; another seven are expected to start operating soon.

Tasks

Create a Statistical Unit in the CCIC to collect data on climate change, emissions, transportation, and demographic and land-use characteristic. The unit will collect, verify and update data, mainly from secondary sources such as the Census Bureau, the DENR, DOTC, DOH, and ETI. It could also be a focal point for an interagency steering committee on special surveys, such as household surveys. Expensive and tedious, data collection and maintenance requires permanent (long-term) professional staff. Such work can easily take six permanent staff. New funding by USAID/Philippines could be used to start up a dedicated unit.

Results

The unit can provide daily and hourly information on air quality in metro Manila. This can provide both a longitudinal and transverse profile for climate modeling. The unit could use low-wage and highly motivated graduate students as analysts. Analysis of a problem is only as effective as the primary data and this statistical item could be a new co-funding resource for USAID, either directly or with other agencies.

REDUCE EMISSIONS FROM MOTORCYCLES AND MOTORIZED TRICYCLES

Motorcycles and motorized tricycles are major sources of emissions, especially of particulate matter (PM), in metro Manila and the Philippines. About 140,000–180,000 motorcycles are in metro Manila and about 1 million in the Philippines; and close to 20 percent of motorized daily trips in metro Manila (1.5 million trips) are by tricycle. More than 75 percent of tricycles are powered by a 2-stroke engine operating on a mixture of fuel and oil. Coupling the characteristics of these engines with poor maintenance and overloading causes them to release 15–40 percent of their fuel air mixture, a mixture that contains PM and CO. Local government handles franchising of tricycles. They are allowed to operate only on secondary roads, in contrast to Jeepneys, buses, and taxis, which are handled by the LTO. As a result, emission standards for tricycles are much less stringent, as is enforcement of standards. Eliminating tricycles (by decree) is neither feasible, nor justifiable given their importance as a form of livelihood and transport among the poor and rural dwellers.

Participants: DENR, DOTC/LTO, MMDA, tricycle associations, motorcycle manufactures, local governments, environmental educational organizations (e.g., Miriam-PEACE, Manila Observatory/CCIC), NGOs for clean air (e.g., Partnership for Clean Air), and manufactures of alternative oils (T2).

Task

Tasks to be supported in part by USAID/Philippines include the following:

- Conduct maintenance workshops for tricycle operators. AED, through Miriam-PEACE, and CCIC are already conducting USAID-funded workshops. These programs should be vastly expanded to reach heads of tricycle associations, who could become trainers.
- Study the feasibility of replacing 2-stroke with 4-stroke motorcycles. Four-stroke engine motorcycles (similar to car engines) are more efficient and less polluting than 2-stroke ones. Filipino operators prefer the 2-stroke because they are easier to repair and cost less. Given the lax attitude toward maintenance, it may be that the only way to reduce emissions while maintaining tricycle transportation is to replace the fleet with 4-stroke motorcycles. In "Philippines Environmental Monitor 2002," the World Bank reported that banning 2-stroke motorcycles and replacing them with 4-stroke motorcycles has been successful in other Asian countries. The Philippines lags most Asian countries in its share of 4-stroke motorcycles:

Country	*New 4-Stroke Motorcycle (%)*
Vietnam	*100*
China	*85*
Thailand	*82*
India	*60*
Philippines	*25*

SOURCE: World Bank *Philippines Environmental Monitor 2002*

The study will evaluate how converting to 4-stroke motorcycles will affect society and individuals. Assuming a positive recommendation, it will propose ways of making the

purchase of 4-stroke motorcycles attractive and will develop work plan for replacing the fleet while minimizing hardship.

Results

Reduced emissions from motorcycles and tricycles.

USE AGRICULTURAL RESIDUES TO PRODUCE ELECTRIC POWER IN RURAL AREAS

The abundant supply of biomass resources (i.e., crop and forest residues, animal waste, sugar, rice, and coconut husks) could be used for commercial power generation in rural areas. Investment in biomass power will be private, but the DOE can support facilitating projects.

Participants: DOE

Tasks

- Provide technical assistance to the DOE in developing a framework for legal, contractual, and technical aspects of small-scale agricultural residue power projects.
- Conduct survey to learn about the quantity and quality of agricultural residue available for potential power developments. The survey could cover coconuts, sugar, and rice.

Results

Small-scale power facilities that use agricultural residue in rural areas can provide power for underserved locations.

IMPROVE ENERGY AND ELECTRIC POWER IN URBAN AREAS

Unconstrained and haphazard growth in urban areas has produced pockets of energy deficits, excessive electric power theft, and disruptions. Technical assistance can help mitigate the energy disparity in some urban areas, while reducing poverty and improving urbanization.

Participants: DOE, DENR, MERALCO

Tasks

- Devise better urban development, planning, and monitoring processes to ensure that electric power, water, and essential infrastructure are available to all dwellings before construction and during habitation.
- Review how other areas with high urban migration (e.g., Brazil, Egypt, and India) have minimized power appropriation, provided essential services, and reduced urban energy poverty.
- Ensure effective dialogue between diverse national government, municipal administration, and NGOs to secure an integrated framework for energy and electric power planning in urban areas.

Results

Better planning will provide an effective framework for expanding energy, electric power, water, and transport infrastructure while reducing poverty.

EXPAND GEOTHERMAL ELECTRIC POWER CAPACITY

Geothermal energy provides electric power from non-polluting local resources, uses domestic expertise and available technology, and can be developed incrementally. Geothermal power accounts for the largest share of indigenous energy production in the Philippines, which is the world's second largest producer of such power. Capacity in 2001 was 1,931 MW, with a defined resource potential of 990 MW that would bring capacity to 2,921 MW. Electricity generated by geothermal was 11,626 GWH; this process displaced the equivalent of 20 million barrels of oil from a fossil fuel plant. There are 614 wells drilled from 9 proven fields. Analytical support to mitigate technological, economic, and financial and environmental constraints on new geothermal facilities could accelerate expanded use of this important technology.

Participants: DOE, PNOC-EDC (PNOC-Energy Development Corp), independent energy developers, with technical assistance provided by the U.S. DOE, IEA, International Geothermal Agency, Geothermal Resource Council, and other organizations.

Tasks

Tasks that could accelerate expansion of geothermal power in the Philippines include:

- Analyzing the financial, economic, and technical constraints of expanded resource development for the PNOC; this would include a financial and shadow economic impact assessment of the local economy;
- Using technical assistance and training to improve the inventory and assessment of geothermal resources using technical data assessments available through advanced computer technology and mapping techniques;
- Providing training in advanced software and acquiring computerized mapping equipment to digitize geothermal resource maps and data basing to assist development analysis;
- Providing technical assistance and training in advanced geothermal resource assessment by DOE-PNOC;
- Providing technical assistance in designing and formulating competitive contracting guidelines to attract foreign direct investment for development and construction of geothermal facilities for electric power and industrial applications; and
- Providing technical assistance and support for an international conference on the geothermal situation in the Philippines (foster discussion among technical, financial and investment experts, review potential constraints on development, attract investment).

Results

Greater use of geothermal electric power will displace imported oil, reduce environmental pollution, use local expertise, and expand resources incrementally. New facilities, using known resources, can expand electric power capacity by 50 percent in the next five years. Mini-geothermal power plants can be developed at remote off-grid locations to provide power to

underserved clients, including Mindanao. Geothermal facilities can also be used for other activities, including food drying and processing. The direct and indirect impact of geothermal development on the Philippines' economy would be positive and significant.

NRECA SUPPORT ELECTRIC COOPERATIVES

The National Rural Electric Cooperative Association (NRECA) can help the 119 electric power cooperatives in the Philippines provide more electricity to 30 million people in 1,600 towns. NRECA has provided technical assistance and training to initiate, develop, and operate cooperatives in the Philippines for over 30 years. The association can help meet the growing need for technical assistance and training for maintaining financing, technical operations, and management requirements under a more competitive environment.

Participants: DOE, ERC, NEA, electric cooperatives

Tasks

- Study feasibility of creating electric generation and transmission cooperatives. As transmission and generation systems in the Philippines change, such cooperatives are needed to improve power supply and delivery. In the United States, 38 cooperatives produce, buy, sell, and transmit power. The risks and benefits of creating cooperatives should be studied.
- Train managers, planners, accountants, and regulatory agencies in financial reporting systems, data, and performance indicators.
- Provide cooperatives with technical assistance and training in procurement and inventory management using joint operation systems.
- Provide technical assistance and training to support optimization of operations by maximizing efficiency of the electric infrastructure while creating revenue-generating activities.

Results

Electric power cooperatives can be more efficient than independent utilities because local members/owners exert effective, direct control on operations. In addition to improving the financial, managerial, and technical capabilities of the 119 existing cooperatives, the potential for developing generation and transmission cooperatives should be explored. NRECA can be an appropriate agency to provide technical assistance.

PROVIDE ADVANCED ENERGY DATA AND ANALYSIS

Valid and reproducible energy data are essential for policy and investment analysis. The technical staff of DOE and ERC requires periodic training in advanced methodologies for collecting, analyzing, and forecasting energy statistics. The staff should be familiar with contemporary software and hardware used in forecasting, analysis, and modeling.

Participants: DOE, ERC, U.S. DOE using PASA

Tasks

- Provide training in energy data protocols, collection, dissemination, and web portals to ensure wide access to energy data.
- Provide technical assistance and training on options for energy modeling for policy analysis.
- Provide technical assistance to ERC staff and train them in financial and economic concepts for rate hearings (e.g., rate of return, cash flow analysis, and internal rate of return).
- Conduct scoping evaluation of requirements for improving DOE's data and analysis software/hardware to advanced standards.

Results

Valid energy data build confidence in energy policy forecasting and attracts investment.

REDUCE RISK OF ENERGY SUPPLY LOSS

Sudden power losses present significant risks to industrial, commercial, and residential consumers. Electric power cannot be stored efficiently. To be reliable, the system must provide for continuous and contemporaneous balance of the total electricity generated, transmitted, and distributed to the total level demanded. Even North America, UK, Italy, and Scandinavia have experienced traumatic power failures during recent months. It appears that their transmission and distribution systems were vulnerable to failure and that grid computers were unable to prevent a cascading loss of power. An effective electric power reliability assessment can mitigate the risk of power loss.

Participant: DOE, ERC, MERALCO, electric utilities

Tasks

- Evaluate electric power system interconnections to ensure that grid manager or system operator controls can respond continuously to traumatic changes in supply and/or demand.
- Provide technical assistance to regulators to ensure sufficient spare generating and transmission capacity, backed up by grid computers to provide for the range of peak loads expected.
- Provide a forum for Filipino and international experts to discuss the impact of and response to an unexpected curtailment of electric power.

Results

A strong economy depends on a reliable electric supply. An effective risk assessment will uncover potential problems, help prevent unexpected power curtailments, and mitigate the results of such curtailment.

INCREASE INVESTMENTS TO SUSTAIN THE ENERGY SECTOR

The economy of the Philippines is dominated by the private sector. Substantial foreign direct investment (FDI) is required to meet infrastructure needs arising from restructuring of the electric power industry, including generation, distribution and transmission components. Sustainable energy growth can be hindered by the perception of relatively high investment risk. International investment funds are highly fungible and seek lower risk environments.
Participants: DOE, ERC, government financial institutions

Tasks

- Provide a forum for discussing investment risk in the Philippines' energy sector (e.g., global and national security, industrial competitiveness, infrastructure, legal and regulatory framework, perceptions of competitiveness and corruption) and include decision makers from national and international levels.
- Design a campaign to improve investors' perceptions of the Philippines to encourage foreign direct investment in the energy sector. This could include marketing directly to potential energy groups, MDB and investors, based on the results of the investment discussion forum.
- Evaluate FDI potential for the Philippines' electric power sector to ensure that long-term planning is realistic. FDI in the sector has declined worldwide, in part because of the stalled Asian economy, but also because of the disappointing financial performance of earlier investments and U.S. companies' general retreat from foreign markets as companies adjust to mergers and acquisitions.

Results

Expanded availability of FDI for the sustainability and expansion of the electric power, natural gas, and renewable energy infrastructure in the Philippines.

IMPROVE ENERGY AND ENVIRONMENTAL POLICY

National policy should ensure the efficient use of energy resources to spur social and economic development and to improve the quality of life in the Philippines. Energy planning must be integrated with the general economic development and policies. Specific goals of energy policy should include (1) ensuring economic efficiency in the supply and use of all forms of energy; (2) reducing waste; (3) increasing income from sales of geothermal, natural gas, and other resources to finance sector development; (4) providing sufficient energy to all segments of society; (5) diversifying sources of electric power to reduce risks; (6) supporting special activities to boost development of rural and special regions; (7) reducing the negative effects of energy, such as pollution from vehicles; (8) meeting national security needs by minimizing the risk of energy constraints; (9) developing and exporting energy technology and expertise to the competitive international market; (10) encouraging diversity and options in renewable energy technologies; (11) expanding the availability and use of clean, domestically produced natural gas to meet industrial and transportation requirements.

Participants: DOE, ERC, DENR, Executive Committee

Tasks

A wide range of tasks can be devised to suit the requirements of areas enumerated above.

Results

USAID can provide technical assistance to the GRP and the Executive Committee to improve the design, development, and implementation of energy and environmental policies.

STRENGTHEN ABILITY OF ENERGY INSTITUTIONS TO IMPLEMENT POLICY

Institutions in the Philippines must have a mandate to develop and implement energy policy effectively.

Participants: DOE, DENR

Tasks

Agency specific support can be devised to provide a framework and understanding of the overall energy situation in the Philippines and the essential individual position each organization has in the effective design, development and implementation of initiatives.

Results

Complex energy and environmental policies can conflict with legal and institutional mandates of other agencies, but strengthening the primary energy policy agencies can help resolve this situation.

5. CONCLUSIONS

The evaluation team reviewed nine ECA programs managed by USAID, Manila, discussed energy and clean air concerns with government agencies and local experts, and visited a number of energy sites. Our consensus is as follows:

- The technical assistance tasks that have been requested by USAID and clients have been implemented satisfactorily without major problems;
- The contractors have provided the specific technical assistance and training requested for DOE, ERC and other GRP agencies;
- Under the requirements of a shifting environment the contractors have responded flexibly to the changing mission of USAID and adjusted to the goals for DOE and ECA programs;
- USAID, Manila has at its disposal a diverse range of essential technical assistance and training expertise to meet the range of current and expected requirements;
- The working procedures, contacts and organizational operations between USAID, Manila, the Executive Committee, and GRP agencies are effective;

- Developing an independent ECA web portal among support contractors, and possibly the public, will ensure the rapid dissemination of information about energy and clean air activities for the interested audience;
- All programs should be reviewed periodically to ensure that they are supporting USAID, Manila's mission. The evolving political, economic, technical, and institutional situation will require adjusting tasks and staff flexibility;
- Energy is an essential commodity for economic stability and growth, and this should provide the strength for the interrelated energy/environment/economic programs including AMORE;
- This program should provide a venue for sharing the positive U.S. experience in energy and clean air policy development with an interested but diverse audience;
- Multilateral development banks and bilateral national development agencies can provide a wide range of topical and specific support in ECA program areas. USAID can work with these organizations to offer planning, advice, support and supplement their activities.

6. RECOMMENDATIONS

The project specific recommendations are included as part of the diagnostic evaluation. An overview of the programs reviewed and discussions of topics in the energy and clean air sector have suggested several generic recommendations.

For the **near term period** the diverse expertise available in the energy and clean air programs are available to provide a wide range of support to improve the situation in the Philippines:

- Technical support from USAID could be required for the pending legislative issues related to natural gas, liquefied petroleum gas and renewable energy that are designed to expand the exploration, development and utilization of environmentally positive indigenous energy resources. These important energy initiatives would require the technical and analytical support of DOE and ERC for effective design and implementation;
- The availability of current, valid and contemporaneous information is essential for the energy experts and public. The websites www.doe.gov.ph and www.erc.gov.ph will continue to be an essential source of information and must be maintained as an independent source. These DOE and ERC websites contain general information, statistics, policy issues, annual reports, regulations, publications, news, links to other energy sites and other issues. This will continue to be an essential resource and must be maintained and improved as the technology changes;
- The ubiquitous availability of websites would suggest that an ECA subset of the USAID, Manila website could be effective in providing information on the operations and results of these programs to a wide audience. Technical papers, studies, reports, training schedules and current meetings could be posted on this site for information and wider participation.

For the **mid to long term period** in addition to the current concerns, there will be new and emerging issues that the energy and clean air group should be prepared to address:

- The senior energy and environment experts must be resourceful to respond effectively to the dynamic issues expected in the energy and environmental sector. The experts and decision makers in the Philippines should be exposed to the broad background of ideas that may be addressed. This will be facilitated by participating in the wide range of thoughts discussed in the energy sector at conferences, seminars, forums, meetings with international experts and interactive dialogs. Periodic periods of planned training will maintain expertise in contemporary topics. This sector changes rapidly and new technologies must be understood for decision makers to make an effective assessment to determine the potential use for the national requirements;
- Improved energy efficiency is the least cost investment for the reduction of energy use in the long term. Initiatives to reduce the infrastructure requirements for energy utilization should be encouraged in every sector. The program for improved energy efficiencies in buildings was initially positive but was not sustainable as the demand for new commercial housing declined. The limited demand for heating for the building envelope in the Philippines made this approach less effective than in more temperate climates. However, the need for initiatives to improve the inefficient energy flow demand in the industrial, commercial and especially the transport sector should be vigorously pursued;
- The concerns of increased greenhouse gas emissions producing global climate change have emerged as an international energy issue over the past decade. This issue will grow in Asia as the emerging economies in both China and India will be increasingly dependent on coal for electric power, and this will provide a substantial level of new greenhouse gas emissions. The need for a regional hub for the collection of data, and to provide analysis on this emerging issue can stimulate the need for a climate change center. The advanced level of technical, economic and institutional expertise on climate change issues that is available in Manila could be utilized as an important asset and continue to be supported by USAID and the related GRP agencies. This center in Manila can provide a forum for research and independent, unbiased discussions on this important regional and international issue;
- The Philippine economy has access to the wide spectrum of energy resources with a projected increasing component provided by indigenous clean natural gas and renewable energy. The proportion of electric power provided by geothermal resources is the highest in the world. The other renewable resources, including hydropower, are moving to economic viability. A strategy designed to utilize the diverse energy resources available can reduce the risks of dependence on a specific energy source, provide a wide technological resource base, enable energy system specialists to export their expertise in the global market, and assist the move to energy autarky.

Creativity will be essential for USAID to anticipate the evolving energy and environmental concerns encountered over the medium to long term period in the Philippines. But creativity can be considered the synthesis of ideas and it is our anticipation that the ideas presented in this evaluation will provide a starting point for developing innovative activities of the USAID energy and clean air group in the Philippines.

APPENDIX A
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APPENDIX C
INTERNATIONAL DEVELOPMENT PROGRAMS

Multilateral and bilateral institutions have provided substantial investment and technical assistance for the Philippines' energy and environmental sectors. Their strategic aim for investment, as well as technology transfer, is to encourage policy and institutional reforms needed to attract foreign direct investment. Multilateral development banks, the World Bank, and the Asian Development Bank (ADB) also provide training, infrastructure development assistance, information transfer, and technical assistance through particular projects. National governments provide a wide range of bilateral support, including official development assistance for projects of mutual interest. In this section we provide an overview of international development programs supported by the World Bank, the ADB, the United Nations Development Program, and numerous bilateral agencies. USAID can work with these organizations to offer advice on, and supplement their activities.

WORLD BANK

Since its inception, the World Bank has provided the Philippines with loans totaling $11.6 billion. In the energy sector, the World Bank recently provided support for electric power and rural electrification. Funding for the ***Masinloc coal thermal power project***—which was initiated in 1990 during severe power shortages in the main grid in Luzon—was completed in October 2002. Funding for the 600 MW plant ($400 million) covered the coal-handling system, harbor facilities for unloading coal, and associated structures. The ADB co-financed the project. The plant is operating efficiently at 80 percent availability and consuming imported low-sulfur coal from China. In 2003, the World Bank initiated a ***$40.6 million project to improve the social situation and institutional strengthening in ARMM***, in Mindanao. The AMORE project can provide direct support to this project. The ***Energy Sector Management Assistance Program*** (ESMAP), managed by the World Bank and the UNDP, provides technical assistance and support for specific technologies and country energy planning assessments. ESMAP completed a study on rural electrification in the Philippines in May 2002. The ***Financing Energy Services for Small Scale Energy Users*** (FINESSE) project was funded by the World Bank and U.S. Department of Energy to encourage market implementation of renewable energy technologies. In the Philippines, the project is conducting appraisals and risk analyses for renewable energy projects. Planned projects include the Electric Cooperative System Loss Reduction, a $12 million program to improve the energy efficiency from rural cooperatives, and thee Rural Power Program designed to remove barriers to expand renewable energy developments and financed through the adaptable program loan (APL).

ASIAN DEVELOPMENT BANK

The ADB has supported power transmission development and air quality improvement in metro Manila. Technical assistance has included planning analysis for rural electrification, managing the downstream natural gas industry, and renewable energy systems. Ongoing and recent projects include

- An electric market and transmission development project—$40 million, 2003–2008

- Power Transmission Reinforcement Project—$90 million, 1998–2002
- North Luzon Transmission and Generation—$244 million, 1995–2001
- Power Transmission North Luzon to Mindanao—$164 million, 1993–1999

The ADB also supported the REACH program, which was intended to reduce vehicle emissions in metropolitan areas. But the program has been suspended and the ADB considers the $100 million loan non-performing because the GRP has not met criteria specified for enforcing emission controls. The ADB's assessment of the Philippine energy sector is that electric power supplies are adequate, most renewable energy projects are not operating cost-effectively, and more public-private energy ventures are required. They have also suggested that the energy restructuring plan be reevaluated, particularly the timing of TRANSCO privatization.

GLOBAL ENVIRONMENTAL FACILITY/ UNITED NATIONAL ENVIRONMENT PROGRAM

The GEF is the main multilateral source of funds for renewable energy in developing countries. Developed after the 1992 Earth Summit in Rio de Janeiro, its purpose is to reduce global warming and encourage alternative energy resources. The UNDP, the UNEP, and the World Bank Group administer GEF grant funds. Renewable energy projects are designed to remove barriers to competitive markets for near commercial technologies and reduce long-term technology costs through demonstration, commercialization, and research.
Ongoing UNDP programs in the Philippines include the following:

- ***Palawan Alternative Rural Energy Support Project***. This $750,000 project aims to demonstrate the viability of the rural energy service company (RESCO) delivery mechanism for renewable energy systems. If the concept is successful, prospects for replication in other rural areas is good.
- ***The Philippines Efficient Lighting Market Transformation Project*** . This $100,000 project is designed to reduce technical and market barriers to efficient lighting installation. The purpose is to uncover the commercial market for energy-efficient lighting in the industrial, commercial, and residential sectors.
- ***Capacity Building for Renewable Energy Development***. This $5 million five-year program is designed to remove technical, commercial, institutional and economic barriers to use of renewable energy technologies. The DOE would include an implementing one-stop-shop office to expedite projects.
- ***Pilot PV-Wind Turbine Hybrid System for Rural Electrification***. This $125,000 pilot project is combining a Kp PV system with a 10KW wind turbine to provide electricity to 200 households in Sicud, Palawan. If successful, this dual energy system could be applied to other duel energy systems in remote and rural locations.

BILATERAL AGENCIES

GTZ, the German Agency for Technical Cooperation, has produced a feasibility study for a wind power assessment at three potential wind farm sites. GTZ has provided wind measurement and data processing equipment for evaluating each site. The ***Danish Agency for International Cooperation*** (DANIDA) has developed the North-Wind project's wind farm using Danish wind technology and turbines. The ***Agency for Development and Cooperation*** (DGIS) of the Netherlands has funded a solar home system distribution project being implemented by PNCC. ***Australian Aid*** has developed a program for solar panels for remote off-grid locations, including medical facilities. The ***Swedish International Development Cooperation Agency*** (SIDA) has provided support for measuring and analyzing air quality data in metro Manila. The ***Czech Republic*** has developed a 750 KW mini-hydro project in Aurora, Quezon. And ***Spanish Protocol*** has several projects:

SPOTS is a PV solar project implemented under the Department of Agrarian Reform. The project involves the manufacture, delivery, installation, and operation of a solar system for 138 agrarian reform communities in Mindanao. Funding is $4 million, with local counterpart participation.

- A grant providing a feasibility study, including site identification and wind resource assessment, for a wind farm in the Camiguin and Caraga region of Mindanao, and Pagudpud, Ilocos.
- Technical assistance to support an ADB project evaluating and monitoring pollution from an industrial facility.