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ANNEX 4

PHILIPPINES COUNTRY REPORT

FROM IDEAS TO ACTION: CLEAN ENERGY SOLUTIONS
FOR ASIA TO ADDRESS CLIMATE CHANGE

June 2007

This report was produced for the United States Agency for International Development (USAID). The authors' views expressed in this report do not necessarily reflect the views of USAID or the United States Government. International Resources Group (IRG) prepared this report for USAID under the ECO-Asia Clean Development and Climate Program; Contract No. EPP-I-00-03-00013-00 Task Order 9.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEBF	ASEAN Energy Business Forum
AMORE	Alliance for Mindanao Off-Grid Renewable Energy
APERC	Asia-Pacific Energy Research Centre
ASEAN	Association of Southeast Asian Nations
BCM	Billion Cubic Meters
BP	Bronzoek Philippines
BPS	Bureau of Product Standards
CBM	Coal Bed Methane
CBRED	Capacity Building to Remove Barriers to Renewable Energy Development
CD4CDM	Capacity Development for the Clean Development Mechanism
CDM	Clean Development Mechanism
CEPALCO	Cagayan Electric Power and Light Company
CESE	Center of Excellence for Sustainable Energy
CME	Coconut Methyl Ester
CNG	Compressed Natural Gas
DANIDA	Danish International Development Agency
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DNA	Designated National Authority
DOE	Department of Energy
DOST	Department of Science and Technology

EAEF	European Commission-ASEAN Energy Facility
ECAP	Energy and Clean Air Project
ECC	Environmental Compliance Certificate
ECP	Energy Council of the Philippines
EMB	Environment Management Bureau
ENMAP	Energy Management Association of the Philippines
EPIRA	Electric Power Industry Reform Act
ERC	Energy Regulatory Commission
EUMB	Energy Utilization Management Bureau
GEF	Global Environmental Facility
GEMP	Government Energy Management Program
IACCC	Philippine Inter-Agency Committee on Climate Change
IFC	International Finance Corporation
JBIC	Japan Bank for International Cooperation
JICA	Japanese International Cooperation Agency
LBP	Land Bank of the Philippines
MBbls	Million Barrels
Mt	Million Metric Tons
Mtoe	Million Tons of Oil Equivalent
MW	Megawatt
NBB	National Biofuels Board
NEDO	New Energy and Industrial Technology Development Organization of Japan
NEECP	National Energy Efficiency and Conservation Program
NGVPPT	Natural Gas Vehicle Program for Public Transport
NPC	National Power Corporation
NRE	New and Renewable Energy
ODA	Official Development Assistance
PM	Particulate Matter
PBE	Philippine Business for the Environment
PCCs	Pre-Commercialization Contracts
PCIERD	Philippine Council for Industry and Energy Research and Development
PCSD	Philippine Council for Sustainable Development
PDD	Project Design Document
PEI	Preferred Energy Investments
PELMATP	Philippine Efficient Lighting Market Transformation Project
PNOC	Philippine National Oil Company
PNOC-AFC	PNOC Alternative Fuels Corporation
PNOC-EDC	PNOC Energy Development Corporation
PSALM	Power Sector Assets and Liabilities Management Corporation
REAP	Renewable Energy Association of the Philippines
TEC	Technical Evaluation Committee
TPES	Total Primary Energy Supply
TSP	Total Suspended Particles
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WB	World Bank
WBCSD	World Business Council for Sustainable Development
WEC	World Energy Council
WRI	World Resources Institute

I. THE PHILIPPINES' ENERGY CHALLENGE

Like many countries, the Philippines is facing a formidable challenge of developing sustainable clean energy options to support the energy requirements of its economic and social development goals with minimal adverse effects on the environment. This country profile presents a brief survey of the policy and regulatory framework, institutions, activities, and remaining barriers to scaling-up of clean energy resources in the Philippines, with the view to identify opportunities for intervention by the ECO-Asia program.

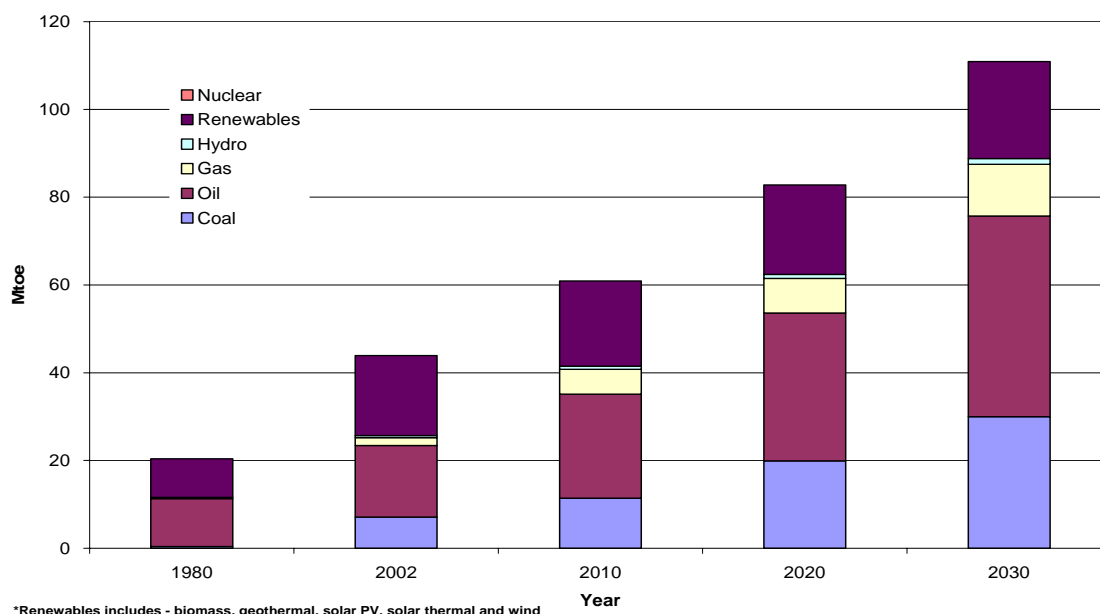
I.1. TRENDS IN ENERGY RESOURCES AND USE

This section discusses key energy trends and environmental impacts based on data obtained from various sources, including the Asia-Pacific Energy Research Centre (APERC), the Asian Development Bank (ADB), and the Philippine Energy Plan.

I.1.1. Energy Supply by Source

Based on data compiled by APERC (2006), total primary energy supply in the Philippines (production plus net imports) amounted to 44.0 million tons of oil equivalent (Mtoe) in 2002. Of this total, the combined share of renewables, (geothermal, biomass, solar, and wind) amounted to 41.5 percent. As shown in **Figure I**, oil was the single largest fuel component, at 37.5 percent. Almost all (96 percent) of it was imported.

FIGURE I: PRIMARY ENERGY SUPPLY BY SOURCE



Source: APERC (2006).

Coal, which made up a substantial share, was largely (86 percent) imported. Natural gas also made a significant contribution in 2002 despite the fact that its commercial production commenced only in that year. APERC projected the country's primary energy supply would increase to 60.8 Mtoe by 2010 and 110.9 Mtoe by 2030. The Philippine Department of Energy (DOE) projects that the total primary energy supply will reach 48.1 Mtoe by 2010 and 54.2 Mtoe by 2014. Both forecasts are much lower

than the APERC forecast of 60.8 Mtoe in 2010. Oil is expected to continue to dominate the energy mix, with a 40 percent share in both forecast years.

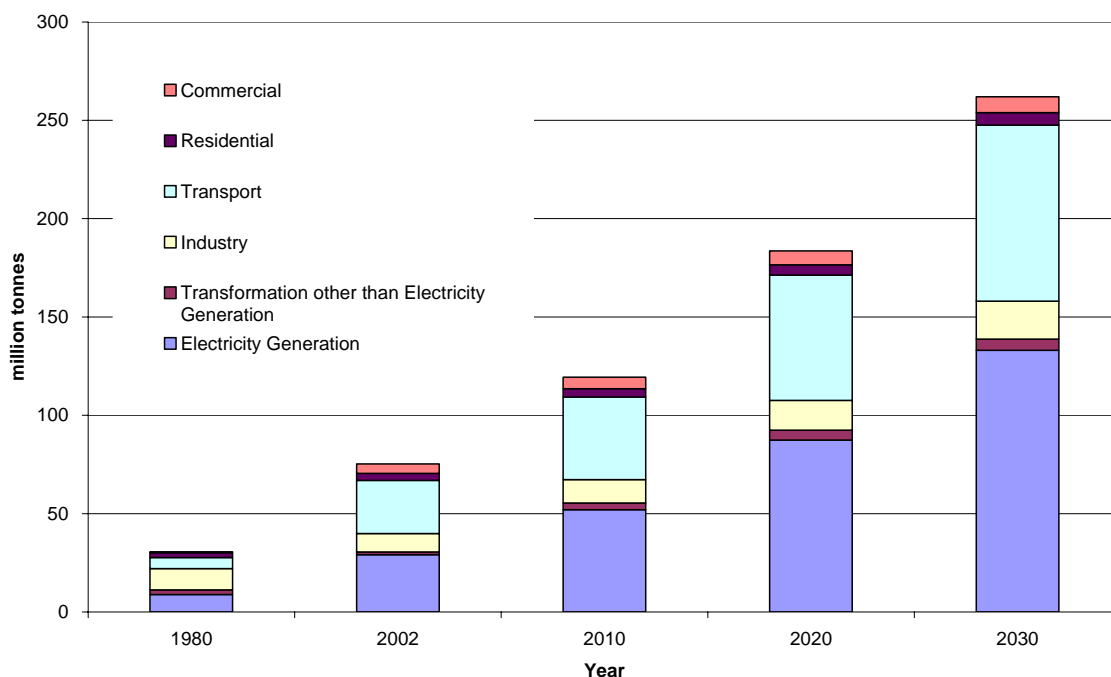
More recent data from the DOE estimated total primary energy supply in 2004 at around 39.5 Mtoe (DOE, 2006). Clean energy forms accounted for almost half of the total, with geothermal contributing the highest share (22 percent), followed by other renewables (mainly fuel wood and charcoal for household use) at 17 percent, and large hydro and natural gas at about 5 percent each. The share of domestic energy in the total primary supply was about 55 percent, which is regarded as one of the major success indicators of the Philippine energy program.

1.1.2. CO₂ Emissions by Sector

Figure 2 shows the electricity generation and transport sectors as the biggest sources of emissions in 2002, representing 38.7 percent and 36 percent of the total respectively. APERC forecasts that these trends will continue up to 2030. The increasing emissions from power generation can be attributed to the large component of coal in the projected generation mix.

In 2002, transport outpaced industry as the No. 1 energy-consuming sector and will continue to remain so in the long term.

FIGURE 2: CO₂ EMISSIONS BY SECTOR



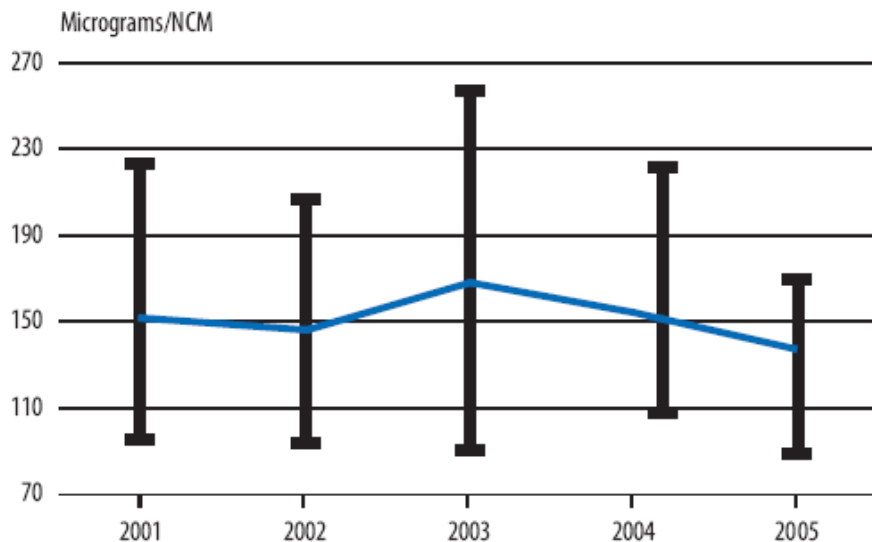
Source: APERC (2006).

1.2. IMPACTS OF ENERGY USE

The latest available ambient air monitoring data in Metro Manila show that roadside concentrations of total suspended particles (TSP) exceed the annual mean guideline value, according to a study by the Asian Development Bank (ADB, 2006). Based on monitoring data from eight locations in Metro Manila, TSP concentrations improved only slightly, with an overall annual decrease of 9 percent, from 2001 to 2005 (Figure 3). The slight improvement from 2001 to 2002 was negated by the increase from 2002 to 2003. TSP concentrations decreased by about 9 percent a year in 2004 and 2005.

In 2005, TSP concentrations at 10 out of 11 roadside monitoring locations in Metro Manila exceeded the Philippine annual mean TSP guideline value (24-hour sampling) of 90 microgram per cubic meter ($\mu\text{g}/\text{m}^3$). The roadside monitoring was conducted by the Department of Environment and Natural Resources (DENR) and the Environment Monitoring Board (EMB).

FIGURE 3: AMBIENT TSP CONCENTRATION IN METRO MANILA



Source: ADB, 2006. (NCM = normal cubic meter).

The two highest annual mean values ($323 \mu\text{g}/\text{m}^3$ and $213 \mu\text{g}/\text{m}^3$) were measured along EDSA, Metro Manila's busiest thoroughfare. In other major cities and urban centers, 45 percent of the 29 operational stations exceeded the annual mean guideline value.

Meanwhile, annual mean particulate matter (PM) 2.5 concentrations exceeded guideline value of the United States Environment Protection Agency (USEPA) at all monitoring locations. PM_{10} concentrations, however, did not exceed the 24 hour and annual mean guideline values. Ambient concentrations of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and lead were below the short and long-term guideline values.

2. CLEAN ENERGY POLICY AND REGULATORY FRAMEWORK

A variety of policy directives, overarching laws and sector or fuel-specific laws and regulatory orders make up the policy and regulatory framework for clean energy in the Philippines. These policy and regulatory instruments set the objectives, create the regulatory authorities and define their mandates, provide fiscal and other incentives, and establish technical, safety, and product standards.

2.1. OVERARCHING ENERGY POLICY FRAMEWORK

The Philippine Energy Plan defines the overall energy sector policy framework in the Philippines. The update for 2006 (DOE, 2006) provides a two-point policy agenda: (i) *Energy independence and savings*, which aims to achieve a 60 percent self-sufficiency level by 2010; and (ii) *Power sector reforms that aim to promote fair and reasonable energy prices in a competitive environment*. The agenda's strategies and

goals indicate a preference for clean and renewable energy sources and technologies in the government’s energy program, particularly the following:

- Increase renewable energy-based capacity by 100 percent in 10 years
- All buses in Metro Manila to run on compressed natural gas (CNG) by 2010
- 2 percent coconut methyl ester (CME) blend with diesel fuel for vehicles by 2009
- 5 percent ethanol blend with gasoline for vehicles by 2007 and 10 percent by 2010
- Convert retired and operating oil-based power plants to natural gas by 2010
- 2.9 Mtoe average annual energy savings in 10 years through the National Energy Conservation Program
- Single-digit national average systems loss of distribution utilities by 2010

2.2. KEY LAWS, DECREES, AND POLICIES

Table I shows the overarching as well as sector and fuel-specific laws that provide the policy and regulatory framework for the development of clean energy in the Philippines.

TABLE I: KEY ENERGY LAWS AND DECREES IN THE PHILIPPINES	
Title	Purpose
Overarching Laws	
Republic Act (RA) 7638: Department of Energy Act of 1992	Created the DOE, and declares state policy and objectives for the energy sector
RA 9136: Electric Power Industry Reform Act (EPIRA) of 2001	Restructures the power sector by separating the generation and transmission functions of the National Power Corporation, and privatizing its generation assets
Philippine Environmental Impact Statement Law of 1978	Institutionalized the Environmental Impact System and requirement for Environmental Clearance Certificates for environmentally critical projects
RA 8749: Philippine Clean Air Act of 1999	Comprehensive pollution control policy that sets limits on emissions from mobile (vehicles) and stationary sources (including power plants)
RA 9275: Philippine Clean Water Act of 2004	Comprehensive policy on water quality management; affects hydro projects and power plant effluents
Energy Efficiency	
RA 7832: Anti-Pilferage of Electricity and Theft of Electric Transmission Lines/Materials Act of 1994	Limits distribution system losses to certain levels and targets single-digit national average system losses by 2010
Administrative Order (AO) 110: Institutionalization of a Government Energy Management Program (2004)	Government aims to reduce its monthly consumption of electricity (in kilowatt-hours) and petroleum products (in liters) by at least 10 percent for a minimum of three years starting January 2005
AO 126: Enhanced Implementation of the Government’s Energy Conservation Program (2005)	
Renewable Energy	
Renewable Energy Policy Framework (2003)	Summarizes DOE objectives, policies, and strategies for promoting further development and utilization of renewable energy
RA 9367: Biofuels Act of 2006	Mandates the blending of all liquid fuels for motors and engines sold in the country with locally produced biofuels

TABLE 1: KEY ENERGY LAWS AND DECREES IN THE PHILIPPINES

Title	Purpose
Presidential Decree (PD) No. 1442: Geothermal Act of 1978	Established the Service Contract System for geothermal energy development and provides incentives for contractors
RA 7156: Mini-Hydroelectric Power Incentives Act of 1991	Provides various tax incentives to qualified private sector developers of small hydropower.
Executive Order (EO) 462: Private Sector Participation in ocean, solar and wind development	Provides the guidelines for private sector participation in ocean, solar, and wind energy development
Clean Transport	
DOE Circular No. 2002-08-005: Interim Rules Governing the Transmission, Distribution and Supply of Natural Gas (2002)	Provides permitting and other regulations for operating transmission and distribution pipelines and other downstream facilities as well as the supply of natural gas; also provides technical and safety standards
EO 290: Ensuring Effective Implementation of the Natural Gas Vehicle Program for Public Transport (NGVPPT) (2004)	Promotes the use of CNG as a clean alternative fuel for transport and provides incentives to NGVPPT participants
Memorandum Circular 55: Mandatory requirements to use 1 percent CME blend in diesel requirements of government vehicles (2004)	First step for full implementation of coco-biodiesel program; also provides some guidelines for biodiesel suppliers to ensure product quality

Source: USAID ECO-Asia Clean Development and Climate Program, 2006.

2.2.1. Overarching Laws

Department of Energy Act: This Act recreated¹ the Department of Energy (DOE) and gave it a broad mandate to formulate and implement policies and programs for the energy sector. In terms of clean energy development it specifically mandates the DOE to "formulate policies for the planning and implementation of a comprehensive program for the efficient supply and economical use of energy consistent with the policies on environmental protection and conservation and maintenance of ecological balance", and to "develop and update the existing Philippine energy program ... with preferential bias for environment-friendly resources."

Electric Power Industry Reform Act (EPIRA): This landmark legislation introduced sweeping reforms in the power sector, with the ultimate goal of promoting competition and efficiency. Its principal provisions are the removal of the National Power Corporation's monopoly in generation and the privatization of 70 percent of its generating capacity in Luzon and the Visayas islands. This has led to private sector participation in large scale RE based power generation, particularly hydropower and geothermal. EPIRA also makes power sector reform a key policy for the promotion and use of "indigenous and new and renewable energy resources in power generation in order to reduce dependence on imported energy."

Philippine Environmental Impact Statement Law: Regulations against pollution or environmental degradation encourage the shift to cleaner fuels and end-use efficiency. This decree prohibited the operation of an "environmentally critical project or area", which invariably includes energy projects, without first securing an Environmental Compliance Certificate.

¹ DOE was created by the DOE Act of 1977 (Presidential Decree No. 1206) and reorganized into the sub-department level Office of Energy Affairs in 1986.

Philippine Clean Air Act: This Act provides for a comprehensive air pollution control policy. It is intended to prevent and control air pollution from mobile (vehicles) and stationary (buildings, structures, facilities, and installations, including power plants) sources. The key provisions of the Clean Air Act include the formulation of the Air Quality Control Action Plan and establishment of Ambient Air Quality Guideline Values and Standards.

Philippine Clean Water Act: This Act applies to water quality management in all water bodies, primarily the abatement and control of pollution from land-based sources. It seeks to designate specific water management areas "using appropriate physiographic units such as watersheds, river basins or water resources regions." This is particularly relevant to hydro projects and power plant effluents, among other water-related energy issues.

2.2.2. Energy Efficiency

There are no laws or regulations that directly mandate the implementation of demand side energy efficiency in the Philippines, except for some directives that apply only to government agencies. DOE initiates various energy efficiency (EE) and conservation programs through its *National Energy Efficiency and Conservation Program*, with the participation of target beneficiaries mostly on a voluntary basis. The *Government Energy Management Program* through *Administrative Orders 110 and 126* has made EE and conservation measures in government offices mandatory. For supply-side EE, the *Anti-Pilferage of Electricity and Theft of Electric Transmission Lines/Materials Act* institutionalized a system loss reduction program for distribution utilities.

2.2.3. Renewable Energy

The *Renewable Energy Policy Framework* embodies the overall objectives, policies and strategies of the DOE for promoting further development and utilization of renewable energy (DOE, 2003). By itself, the framework does not have the force of law, but there have been efforts to pass legislation to provide comprehensive and more drastic measures to accelerate the development and advancement of renewable energy resources. The latest version of the bill in Congress includes such measures as: (i) a *Renewable Portfolio Standard (RPS)*, i.e., the minimum percentage that generation companies are required to source from RE resources; (ii) establishment of a *Renewable Energy Market* as a sub-market under the Wholesale Electricity Spot Market; (iii) a *Green Energy Option* program in which end-users with a monthly average of at least 100 kW may directly contract for renewable energy based energy; and (iv) *Net-metering agreements* between distribution utilities and qualified small distribution grid users.

Meanwhile, there are laws and regulations providing the policy and regulatory framework for the development of specific renewable energy resources, such as the following:

- **The Geothermal Act** established the Service Contract System (the production sharing regime for domestic energy resources in the Philippines) for geothermal development and provides incentives to contractors, including recovery of expenses and exemption from all taxes except income tax.
- **The Mini-Hydro Law** aims to enhance the development of the country's domestic energy resources by providing various tax incentives to qualified private sector developers of small hydropower.
- **Executive Order 462** and a subsequent amendment (*EO 232*) provide the guidelines for private sector participation in ocean, solar, and wind energy development. *DOE Circular 2004-05-005* was issued to streamline and rationalize the granting of subsidies in the electrification of missionary areas using PV solar systems.

2.2.4. Clean Transport

Biofuels are seen as sustainable transport fuel options in the Philippines because they are virtually inexhaustible and offer additional benefits of boosting agricultural productivity and rural employment. Proof of this recognition is the relatively swift passage in Congress of the landmark *Biofuels Act of 2006* and its signing by President Arroyo on 19 January 2006. The Act mandates the pre-blending of all liquid fuels for motors and engines sold in the country with locally produced biofuels.

- (a) Gasoline: 5 percent bioethanol by volume within two years of enactment, rising to 10 percent two years thereafter, subject to the determination of its feasibility by the governing body created by the Act, the National Biofuels Board (NBB).
- (b) Diesel engine fuel: a minimum of 1 percent biodiesel by volume within three months of enactment, rising to 2 percent two years thereafter, again subject to the NBB's determination of its feasibility and availability of local biodiesel supply.

Prior to the passage of this Act, the government spearheaded the promotion of the use of biodiesel through *Memorandum Circular 55*, which required the use of 1 percent CME blend in the diesel requirements of government vehicles. The Circular also enjoins oil companies to support the development of renewable fuels in the same way they support auto manufacturers. *Executive Order 449* reduced the import duties on bioethanol products to be used in the program from 10 percent to 1 percent. The DOE has also initiated the drafting of ethanol fuel standards.

To promote the use of CNG, *Executive Order 290* provides various incentives including a negotiated/subsidized CNG price for seven years for the first 200 CNG buses. EO 396 subsequently reduced the duty from 1 percent to 0 percent for NGV industry-related equipment, parts and components, while *DOE Department Circular No. 2005-07-006* directs the enhanced implementation of the Natural Gas Vehicle Program for Public Transport and the development of CNG supply and infrastructure.

Large-scale implementation of the CNG program and the expansion of the gas industry as a whole hinges on the availability of a reliable, pipeline-based transmission and distribution infrastructure. Towards this end, the DOE issued *DOE Circular No. 2002-08-005*, otherwise known as the Gas Circular, to provide the policy and regulatory framework for the operation of transmission and distribution pipelines and other downstream facilities. There are pending gas bills in Congress that seek to address gaps in the Gas Circular, particularly ownership rules for transmission and distribution facilities, and delineation of regulatory functions between DOE and ERC, and provide fiscal and other incentives for investments in infrastructure.

3. INSTITUTIONAL ANALYSIS

The DOE Act and other landmark legislation are intended to foster a more free-market oriented institutional structure in the energy sector, with the government providing only the enabling environment for the private sector to finance and undertake the development of resources and infrastructure. A survey of the institutions for clean energy development shows a transition towards this goal with government still playing a key role either in terms of actual participation or through regulation.

3.1. ORGANIZATIONAL OVERVIEW

This section presents a brief profile of the key institutions for clean energy according to three key functions: (i) policy-making, planning, and program coordination, (ii) regulation, and (iii) resource development. (See summary in **Table 2** below).

3.1.1. Policy-making, Planning, and Program Coordination

DOE is the main policy-making and planning body for the energy sector in the Philippines, and is mandated to annually update and submit the Philippine Energy Plan to Congress. With the passage of EPIRA, the DOE has also taken over the preparation of the Power Development Plan from the National Power Corporation (NPC). It was also tasked to consolidate the plans and programs of the distribution utilities and the rural electric cooperatives into a Distribution Development Plan. DOE also prepares Regional Energy Profiles in coordination with regional and local economic planning authorities.

The DOE also undertakes various programs to promote and catalyze private sector participation in the development of renewable energy and alternative transport fuels and in energy efficiency, mainly through the *Energy Utilization and Management Bureau*. The EUMB also coordinates electrification projects of government and private entities and administers funding for grid-extension and off-grid electrification.

Meanwhile, the *Philippine Council for Industry and Energy Research and Development*, an agency under the Department of Science and Technology, coordinates policy and programs with respect to the scientific and technological research, development, and demonstration of new and renewable energy technologies. It also serves as a conduit of ODA funding, which is available to research institutions and NGOs. The government also instituted two inter-agency and multi-sectoral bodies to coordinate national activities on sustainable development and climate change.

The *Philippine Council for Sustainable Development (PCSD)* institutionalized the participation of members of civil society as counterparts of government representatives in pursuing sustainable development initiatives in the country. One of PCSD's tasks is to review and ensure the implementation of the Philippine commitments to sustainable development principles made at the 1992 United Nations Conference on Environment and Development (UNCED).

As a first step to respond to climate change, the *Philippine Inter-Agency Committee on Climate Change (IACCC)* was established on 8 May 1991 by PAO No. 220 to coordinate various climate change related activities and prepare the Philippine positions for the UNFCCC negotiations. IACC is co-chaired by the secretaries of the Department of Environment and Natural Resources and the Department of Science and Technology, and has representatives from about 15 government agencies and NGOs.

3.1.2. Regulation

DOE also performs regulatory functions. Specifically, it administers contracts for the upstream exploration and development of oil and natural gas, coal, and geothermal resources. It is responsible for issuing permits to entities wishing to engage in the construction and operation of facilities for the transmission and distribution of natural gas and other downstream facilities, and also in the supply of natural gas. For the deregulated downstream oil industry, the function of DOE is limited to monitoring anti-competitive behavior of industry players.

The other main agency for economic regulation, particularly pricing and competition, is the *Energy Regulatory Commission (ERC)*. ERC is a quasi-judicial regulatory body accountable directly to the Office of the President. Created by the Electric Power Industry Restructuring Act to replace the ERB, its responsibilities and activities are focused on the power sector. A natural gas bill aims to expand and strengthen the powers and functions of ERC to regulate natural gas prices and enforce competition.

TABLE 2: KEY INSTITUTIONS FOR CLEAN ENERGY DEVELOPMENT

Institution	Scope of Work
Government Agencies	
Department of Energy (DOE)	Coordinates policy-making, planning, and program coordination for the entire energy sector
DOE-Energy Utilization and Management Bureau	Implements DOE programs on energy efficiency, renewable energy, and alternative transport fuels
DOE Natural Gas Office	Oversees DOE program for the development of natural gas industry, and issues permits for gas transmission, distribution and supply businesses
Energy Regulatory Commission	Regulates and promotes competition in the restructured electricity industry, and sets gas distribution prices
Philippine National Oil Company	Upstream energy resource development, petroleum transport and marketing, and alternative fuels development
National Power Corporation	Supplies electricity to missionary areas, particularly islands not connected to the main grid
National Electrification Administration	Coordinates government's rural electrification program, including management supervision of electric cooperatives
Philippine Electricity Market Corporation	Operates the Wholesale Electricity Spot Market
Philippine Council for Industry and Energy Research and Development	Plans, monitors, and promotes scientific and technological research for applications in industry, energy, utilities and infrastructure; also acts as conduit of funds for energy R&D
Department of Environment and Natural Resources (DENR)	Issues and monitors compliance with Environmental Clearance Certificate for environmentally critical projects, including most energy projects, and is the Designated National Authority (DNA) for Clean Development Mechanism (CDM) implementation
DENR-Environmental Management Bureau	Implements environment mandate of DENR; also acts as Secretariat to the DNA and the Inter-Agency Committee on Climate Change
Bureau of Product Standards	Adopts and enforces labeling and standards for energy appliances and equipment and for petroleum products
Development Bank of the Philippines	Provides financing for SMEs and local government units, especially for environmental protection, climate change, and NRE projects
Land Bank of the Philippines	Provides credit assistance to small farmers, fishermen, and SMEs; acts as financing intermediary for renewable and other clean energy projects
Non-Governmental Organizations (NGOs)	
Energy Management Association of the Philippines	Advocacy and promotion of energy efficiency
Renewable Energy Association of the Philippines	Advocacy and promotion of renewable energy
KLIMA/Climate Change Information Center – Manila Observatory	Data and information center on climate change, GHG assessment, and CDM capacity building
Preferred Energy Inc.	A non-profit corporation operating as a consultancy with a development focus, primarily in RE and CDM
Energy Council of the Philippines	Local chapter of the World Energy Council with mostly CEOs of private energy companies as its members; promotes business solutions to renewable energy development

Source: USAID ECO-Asia Clean Development and Climate Program, 2006.

For its part, the *Department of Environment and Natural Resources* regulates the energy industry through enforcement of environmental laws and regulations. This is mainly done through the *Environmental Management Bureau (EMB)*, which issues Environmental Clearance Certificates. EMB also acts as the Secretariat to the DNA for CDM activities and the Inter-Agency Committee on Climate Change.

Finally, the *Bureau of Product Standards* supports industry and protects consumers' welfare through the development and promulgation of standards, product testing and certification, accreditation of testing and calibration laboratories, management system certification bodies, and private emission testing centers.

3.1.3. Resource Development/Industry Operations

The energy industry in the Philippines is a mix of public and private sector participants. State-owned corporations are active in the development of renewable energy and other clean energy sources although there has been increasing interest and participation from the private sector.

Government-owned corporations

The *Philippine National Oil Company (PNOC)* and its subsidiaries undertake various activities on clean energy. PNOC Energy Development Corporation (PNOC-EDC) is the major geothermal producer in the country, having installed a total of 1,229 MW or 64 percent of the 1,930 MW geothermal capacity installed nationwide. It is also engaged in the development of other renewable energy resources, including wind and solar. PNOC Exploration Corporation (PNOC-EC) is actively involved in oil, gas, and coal exploration, and is planning to invest in the development of the gas transmission and distribution pipeline in Luzon. Since the 1970s, PNOC has been involved in the search for new and renewable energy resources, mainly through the Energy Research and Development Center. Recently, PNOC has set up the PNOC-Alternative Fuels Corporation (PNOC-AFC) to pursue the biofuels business, while another government holding company, the National Development Corporation, in partnership with Bronzoeck Philippines Inc. and local private companies, has established the first bioethanol manufacturing plant in the country.

The *National Electrification Administration*, for its part, has a major role in promoting renewable energy through rural electrification. Its projects are either funded from government funds or ODA-assisted.

Banks and Financial Institutions

Government banks and financial institutions serve as conduits for ODA financing of clean energy projects, particularly renewable energy, energy efficiency, and more recently CDM projects. Some private banks have also ventured into in-house financing of clean energy projects. The two major government banks involved in financing clean energy projects are the *Development Bank of the Philippines* and the *Land Bank of the Philippines*.

The Development Bank of the Philippines has the primary mandate of providing for the medium and long-term financing needs of enterprises, with emphasis on SMEs, particularly in the countryside. Together with the Land Bank, DBP is also a main source of finance to local government units. Its lending program caters to environmental protection, climate change, and renewable energy projects.

The Land Bank of the Philippines has a mandate to promote countryside development and one of its major roles is to provide credit assistance to small farmers, fishermen, micro-enterprises and SMEs, livelihood loans, agriculture projects, and environment projects. This makes it an ideal financing intermediary for renewable and other clean energy projects.

Industry Associations and NGOs

NGOs and industry associations that act as advocacy groups are present in almost all aspects of the energy industry in the Philippines. The following are some of the more prominent associations and NGOs involved in clean energy.

The *Energy Council of the Philippines (ECP)* is the local chapter of the World Energy Council (WEC) and its members are mostly CEOs of private energy companies. The ECP provides a forum for discussing and consolidating industry position on vital issues, and initiates dialogue with key energy officials. The ECP also hosts national and international seminars and roundtable discussions on key issues, and serves as a link to the regional and global energy networks, including the ASEAN Energy Business Forum. Jointly with the UK Department of Trade and Industry, the Philippine DOE and the WEC, the ECP established in 2003 and hosted the *Centre of Excellence for Sustainable Energy (CESE) for Southeast Asia*. The CESE, which ceased operation by the end of 2006, had aimed to promote a business approach to developing sustainable energy and also hosted seminars and workshops on current energy issues.

Other NGOs active in clean energy include: the *Energy Management Association of the Philippines (ENMAP)*, which promotes energy efficiency and climate change mitigation; the *Renewable Energy Association of the Philippines (REAP)*, which is involved in the advocacy, promotion, and utilization of Renewable Energy; *Klima-Manila Observatory*, which has extensive activities in GHG assessment and CDM capacity building, and; *Preferred Energy Investments, Inc. (PEI)*, which operates as a development-oriented consultancy for catalyzing private sector investments in RE and conducts CDM training for local government units.

Private Sector

The private sector is becoming increasingly involved in the development of clean energy resources. The *Cagayan Electric Power and Light Company (CEPALCO)*, a private company involved in the distribution of energy in Mindanao, is undertaking renewable energy projects for distributed generation. It has set up the biggest solar energy project so far, a 1 MW grid-connected solar photovoltaic (PV) system, with partial financing by the Global Environment Facility (GEF) and the International Finance Corporation (IFC). Likewise, *Northwind Power Development Corporation* recently commissioned the biggest wind power project to-date, a 25 MW project in Ilocos Norte province. Private companies are expected to develop more wind power sites, particularly *Trans-Asia Renewable Energy Corporation* and *San Carlos Wind Power Corporation*, which were awarded pre-commercialization contracts for projects with potential generation of 25 MW and 30 MW respectively. Clean transport fuels development is also anchored on private sector participation. Two private companies, *Senbel Fine Chemicals* and *Chemrez*, have so far secured accreditation by DOE as biodiesel manufacturers.

The privatization of the National Power Corporation's generating assets has paved the way for private sector participation in large-scale hydropower development. *First Generation Holdings Corporation (FirstGen)* has acquired the 112 MW Pantabangan-Masiway Power Complex auctioned off by the Power Sector Assets and Liabilities Management Corporation (PSALM) in September 2006. FirstGen also owns and operates the two (out of three) natural gas-fired power plants in the country, with a combined capacity of 1,600 MW. *Aboitiz Power Corporation* in consortium with Norway's SN Power has also won the bidding for the 360 MW Magat Hydroelectric Power Plant in Ramon, Isabela (PSALM, 2006). The Aboitiz Group is also the parent company of HEDCOR, which is the major developer and owner of the majority of the mini-hydro installations in the country.

3.2. INSTITUTIONAL NEEDS ASSESSMENT

Despite the proliferation of institutions involved in clean energy development, there are still institutional barriers to the effective implementation of policies and programs. Based on this survey and the insights gathered during the listening tour and stakeholder consultations, some of the more important concerns are as follows:

- There is too much “preaching to the choir”. The energy agencies need to take a more cross-sectoral approach to involve other departments and institutions.
- Laws are in place but implementation is weak. There is also a tendency for laws to be subjected to conflicting interpretations and the government fails to assert its role as the final arbiter.
- Government officials and the private sector need training on identification of GHG mitigation potential and technology assessment. Academia has to be involved as well, to enable long-term capacity building.
- DOE planners need to strengthen capability on end-use modeling and data collection.
- Government and investors need technology transfer (success elements) and sharing of experiences in financing of actual projects.
- Regulators and manufacturers need capacity building on harmonization of standards for EE and RE equipment.
- There is a need to avoid one-off projects, i.e., government policy should be resource-driven and open to fast-paced development of technology.
- There are too many programs and they need to have more effective coordination.

4. CURRENT STATUS AND POTENTIAL OF CLEAN ENERGY

The Philippines has been particularly successful in the development of its geothermal, hydropower, and even natural gas resources. Other resources such as wind, solar, and energy efficiency have not been exploited but offer hope for long-term energy security due to the large resource potential and their compatibility with the Philippines’ sustainable development objectives. The discussion in this section draws liberally from the Philippine Energy Plan, particularly the 2006 update (DOE, 2006).

4.1. OVERVIEW OF FUELS AND RESOURCES

4.1.1. Fossil Energy and Nuclear Power

Coal. Coal resources are largely unexploited and production in 2004 represented less than one-third of total demand, the balance coming from imports. This can be attributed largely to the low-rank quality of local coal, which makes it a less viable option for power generation unless it is blended with imported coal. To maximize the use of coal for power generation, several coal power plants have adopted clean coal technologies. The government has also entered into agreements with developed countries to assist in demonstrating projects on clean coal technology. These include a study by the US Geological Survey to help the Philippines explore the possibility of developing its coal bed methane (CBM) resources, an emerging natural gas resource that has evolved nationwide as an alternative, clean burning fossil fuel.

Oil. Petroleum resources are also not fully explored. Domestic oil production accounts for a minuscule share (1.2 percent in 2004) of total demand. The commercial discovery of natural gas and its utilization for power generation along with the surge in international oil prices provided an impetus for renewed

interest in oil and gas exploration. The government is targeting an increase in petroleum reserves from 69.5 Mtoe in 2004 to 83.6 Mtoe by 2014.

Natural Gas. The Philippines has a nascent, virtually “single-project” gas industry. Production to supply gas to the country’s three power plants (with an aggregate capacity of 2,700 MW) started only in 2002, but the resource already accounts for about one-third of the installed generation capacity in the country. There is a potential for some 4,000 MW of additional gas-fired capacity and expanded use of natural gas in other sectors, including transport. The gas transmission and distribution infrastructure needs to be developed to reach these new markets and encourage new sources of gas supply.

Nuclear Power. There has been no nuclear power development in the Philippines since the Aquino government decided to scrap the first and only nuclear power plant built in the country, a 620-MW Bataan nuclear power plant, due to safety concerns and political issues.

4.1.2. Renewable Energy and Distributed Generation

Geothermal. The Philippines current status as the second largest producer of geothermal energy in the world (and first in terms of the share of the resource to total power generation capacity) is an outstanding achievement in renewable energy development. With an installed capacity of around 1,930 MW as of 2006, much of the known economic potential has been exploited. DOE projects geothermal capacity to increase by about 820 MW from 2009 to 2014. However, there are only two committed projects, the 53.8 MW Northern Negros and the 20 MW Nasulo geothermal projects of PNOC-EDC, for commissioning by 2007 and 2008 respectively. DOE is also promoting the development of low-enthalpy geothermal areas for non-power or direct use, such as health and spa applications.

Hydropower. Being an archipelago, the Philippines has abundant hydropower resources, and has exploited a significant percentage of the known potential. Currently, there are 134 hydropower plants in operation in the country, with 21 large hydropower plants, 52 mini-hydro and 61 micro-hydro power plants. The target in the 2006 energy plan update is to increase hydropower capacity by 780 MW, from 3,219 MW in 2004 to 3,999 MW by 2014. The indicative capacity addition is roughly 30 percent of the estimated untapped potential of 2,603.5 MW.

Wind. The resource potential for wind in the Philippines is estimated at 76,000 MW (DOE, 2006, pp 22) with 47 provinces having at least 50 MW wind potential and 25 provinces with about 1,000 MW each. The World Wildlife Fund conducted a similar study and found that the country has 1,038 wind sites that could generate about 7,404 MW of electricity. The biggest wind project so far, the 25 MW Northwind power project in Ilocos Norte, was commissioned in 2006. Some 345 MW of capacity from 16 additional wind power sites is expected to be added between 2008 and 2010, including the 40 MW Northern Luzon Wind Power Project of PNOC-EDC. Pre-commercialization contracts have also been awarded to various companies to further explore and develop potential wind power sites in the country, with a combined capacity of 140 MW.

Solar. Solar energy has a niche market in rural electrification, whether grid connected, distributed generation or off-grid, and also for water pumping, lighting, and other domestic applications. As of 2005, a total of 894 solar home systems (SHS) were installed through Solar Home Systems Distribution Project of the Philippine National Oil Company. Meanwhile, the USAID-funded AMORE project has energized 224 rural villages using PV systems. The biggest solar PV installation so far is CEPALCO’s 1 MW PV, which is operated in tandem with a hydropower plant; the PV output is used in lieu of

hydropower during the daytime, while the water required to produce the 1 MW equivalent output is stored and released for hydropower generation during peak hours.

The Philippines aims to become the solar technology manufacturing export hub of the ASEAN region. The US\$300 million Sunpower Solar Water Fabrication plant in Sta. Rosa Laguna is expected to supply about 6 percent of the world market for PV cells – 20 percent of which shall be sold to the local market at a discount to encourage the establishment of a downstream solar industry in the country.

Biomass. An estimate of the Department of Agriculture and the Department of Environment and Natural Resources shows that the country's agriculture sector could have potentially produced 39.23 Mtoe of biomass in 2003, increasing moderately by 1.9 percent annually. By 2012, biomass supply potential could reach the equivalent of 46.66 Mtoe (DOE 2003, p. 23). Moreover, based on the study *Power Switch and Strategies for Clean Power Development in the Philippines*, the country has a potential installed capacity of 235.7 MW from bagasse resources. PNOC is planning to develop a 30 MW bagasse cogeneration project with Bronzeoak Philippines Inc. and Talisay Bioenergy Inc. PNOC has 30 percent equity participation in the project.

4.1.3. Energy Efficiency

DOE initiates various energy efficiency and conservation programs through its *National Energy Efficiency and Conservation Program (NEECP)*. Dubbed "EC Way of Life", it has five sub-programs: (i) a nationwide information, education and communication campaign; (ii) voluntary agreement programs; (iii) energy labeling and efficiency standards; (iv) energy management programs; and (v) alternative fuels and technology programs (DOE, 2006). Participation by the private sector is largely voluntary, except for the energy labeling program. Energy conservation in government agencies, however, is mandatory under the Government Energy Management Program, which is also part of the NEECP.

In 2004, NEECP generated an estimated savings of 1.17 Mtoe. During the planning period from 2004-2014, the cumulative savings from NEECP is projected to reach 27.62 Mtoe.

Demand Side Energy Efficiency

Compared to its ASEAN counterparts, the Philippines is quite advanced in implementing an energy labeling program. Labeling is mandatory and is enforced by putting labels of EE rating or energy consumption on appliances and equipment, which allows the public to compare the effective cost of competing brands and models. DOE sources claim that standards could be enforced only on air conditioners, since these were developed when the enabling law, *Batas Pambansa 30*, was still in effect. The law expired in 1990. For refrigerators, energy labeling is done but the standards are not enforced. For compact fluorescent lamps (CFLs) and electromagnetic ballasts, accreditation is on a voluntary basis. Likewise, car manufacturers and assemblers are only encouraged to display in their showrooms the fuel economy rating results from DOE tests (DOE, 2005).

Supply Side Energy Efficiency

There are two government-initiated programs on supply side energy efficiency: Heat Rate Improvement of Power Plants and the Systems Loss Reduction Program. To enforce the former, ERC set heat rate standards of 10,850 BTU/kWh for oil-fired power plants and 9,773 BTU/kWh for coal-fired power plants. Under the Systems Loss Reduction Program, ERC limits allowable distribution system losses to certain levels and targets single-digit national average system losses by 2010. DOE is also pushing a

program for the retirement of old, inefficient oil-based thermal power plants and is encouraging their conversion into natural-gas based combined-cycle gas turbine power plants.

4.1.4. Clean Transport

The Philippine government has an aggressive program for introducing alternative clean transport fuels, particularly biofuels, compressed natural gas (CNG) and autogas (LPG) to reduce the transport sector's dependence on oil as well as local pollution and greenhouse gas emissions.

The government has an ambitious target to have all buses in Metro Manila running on CNG by 2010. Through its Natural Gas Vehicle Program for Public Transport the government provides incentives for transport operators to shift to CNG and encourages the development of supply infrastructure. At present, the government is facilitating the construction of a "mother-daughter" delivery program, whereby CNG is brought by trucks from the regassification facility to the refilling stations over a 100 km stretch. This raises a concern about traffic and turn-around time, among other issues. Prospective operators of CNG bus fleets have pointed to the need for a pipeline-based supply of natural gas to enable large-scale deployment of natural gas vehicles. DOE is trying to address this concern by promoting the development of the backbone transmission and distribution infrastructure, including CNG refilling stations and encouraging investments in such facilities by pursuing enhancements to the policy and legislative framework. However, a natural gas bill, which has reached an advanced stage of deliberation in Congress, has yet to be passed into law.

The passage of the Biofuels Act is expected to boost deployment of biofuels. The Act provides for grace periods for the mandatory use of biofuels to ensure the availability of adequate supply and infrastructure. As noted earlier, DOE has so far accredited two biodiesel manufacturers, namely, Senbel Fine Chemicals, which has 54 retail outlets nationwide and Chemrez, with 56. A 10 percent ethanol-blended gasoline, "E10", is already being sold in the retail stations of Seaoil and Flying V, (DOE, 2006, p.24), but the ethanol used is imported. As also noted previously, the first bioethanol manufacturing plant in the country has been established by the state-owned National Development Corporation in partnership with Bronzoek Philippines and local private companies

4.2. COMPARISON OF ECONOMIC POTENTIAL AND COST EFFECTIVENESS

4.2.1. Resource Potential vs. Production

The Philippines' hydrocarbon potential is largely unexplored, especially oil and coal (see Table 3), as noted in the previous section. In the case of renewables, geothermal and hydro resources are in an advanced stage of development, while wind energy potential appears to be the most untapped.

TABLE 3: POTENTIAL VS. PRODUCTION OF ENERGY RESOURCES

Fuel	Reserves	Production	R/P ratio (years)
Petroleum (Mtoe)	69.5		
Oil (MBbls)	25	0.14	179
Natural Gas (BCM)	65	2.53	25.7
Condensates(MBbls)	59	NA	-
Coal (Mt)	360.2	2.81	128.2
Renewables	Potential Capacity (MW)	Installed Capacity (MW)	Utilization (percent)
Geothermal	2,758	1,930	70
Hydropower	5,823	3,219	55

Wind Energy	76,000	25	nil
Bagasse	236	NA	
Solar	NA	NA	

Source: DOE, 2006.

4.2.2. Economics of Power Generation

Table 4 shows the different capital and production or generation costs for a number of power generation options in the Philippines. A cursory look at the figures indicates that despite higher capital costs, hydropower appears to be the most competitive among the large-scale options, followed by natural gas, coal, and then geothermal. However, it is very difficult to make a meaningful comparison of these options, without a more exhaustive study of the cost factors, which could not be done within the timeframe of this report.

Apart from capital costs, the generation cost is affected by a host of factors, some of which are subjective and site or project specific. According to some sources, civil works for hydro projects make up about 70 percent of the cost. Fuel cost, on the other hand, can be a subjective factor, depending on inter-fuel competition and the market power of buyers and suppliers.

With due regard to these caveats, the figures indicate that other renewables, such as small hydro and bagasse cogeneration, and maybe even wind, are quite competitive with fossil fuels and the more developed renewable options. Solar is still much more expensive and the 1 MW PV project of CEPALCO was only meant to be a showcase, with US\$4 million out of the US\$5.3 investment funded from a GEF and IFC grant. The 28 US cents/kwh indicated in the table is the selling rate required by CEPALCO only to recover its US\$1 million equity. However, this is much higher than CEPALCO's avoided cost, which is the grid rate of about 7 US cents/Kwh. Moreover, since the PV is operated as a substitute to CEPALCO's hydro generation during daytime, the PV output is sold at the selling rate for hydro of about 7 US cents/Kwh.

TABLE 4: COMPARATIVE COSTS OF POWER GENERATION

Fuel Type	Capital Cost (\$/kW)	Generation Cost (US cents/kWh)
Fossil Fuels		
Coal thermal	1,000-2,000	6.7
Bunker C fuel oil	1,000-2,000	13.9
Distillate: simple cycle gas turbine (GT)	<1,000	26.7
Bunker C: combined cycle GT	<1,000	8.0
Natural gas: combined cycle GT	750	6.1
Renewables		
Geothermal	> 2,000	7.7
Large hydro	> 2,000	4.6
Small hydro	1800-2,000	6.4
Wind energy	2,000	7.8
Solar PV ¹	5,300	28.0 ²
Bagasse cogeneration	1,900	6.2

¹ CEPALCO 1 MW PV Project.
² Required selling rate to recover US\$1 million investment.
 Source: DOE data unless indicated otherwise

5. CARBON AND GREENHOUSE GAS ABATEMENT

Carbon market activities in the Philippines are essentially focused on participating in the CDM as one of the flexibility mechanisms under the Kyoto Protocol. The abundance of renewable energy resources in the country is believed to offer a large potential for developing CDM projects.

5.1. STATUS OF ACTIVITIES IN THE CARBON MARKETS

The Philippines ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1994 and the Kyoto Protocol in November 2003. To enable the country's participation in the Clean Development Mechanism (CDM) under the Kyoto Protocol, Executive Order 320 appointed the DENR as the country's Designated National Authority (DNA) for CDM. The DNA grants the host country approval of a proposed CDM project, which is a prerequisite to its registration by the CDM Executive Board. The EMB serves as the CDM Secretariat. The DENR established a set of national criteria for determining whether a proposed CDM project activity contributes to the country's sustainable development goals and evaluates compliance against such criteria through technical evaluation committees and a CDM Steering Committee composed of representatives from government agencies, the private sector, and NGOs (EMB, 2006a).

As of the end of 2006, the Philippines had seven projects registered by the CDM Executive Board (UNFCCC, 2007). The aggregate annual GHG emission reduction potential of these projects is estimated at 240,629 metric tons of CO₂ equivalent per annum (UNFCCC, 2007). Meanwhile, 22 projects have undergone or are undergoing validation by CDM designated operational entities, of which 16 are waste management or waste-to-energy projects, and the rest are renewable energy projects.

5.2. INSTITUTIONAL CAPACITY FOR MEASURING AND REPORTING GREENHOUSE GAS ABATEMENT

The development of institutional capacity for measuring and reporting GHG abatement as well as CDM implementation has been an ongoing effort involving government agencies, NGOs and the private sector. Various donor-initiated activities have helped in these capacity building efforts (EMB, 2006b).

5.2.1. Ongoing Programs

The *Integrated Capacity Strengthening for the CDM* program, which is being conducted by the Institute for Global Environmental Strategies (IGES) of Japan for the Japanese Ministry of the Environment (JMOE), aims to assist the Philippines in the realization of concrete CDM projects. The proposed activities under the program are: (i) to generate a pipeline of CDM projects through organizing provincial workshops; and (ii) to assist CDM preparation through hosting technical tutorials on preparing the Project Design Document (PDD) for project developers, project owners, and government staff.

The *JICA Study on Capacity Building to Promote CDM Projects in the Republic of the Philippines* conducted from November 2005 to November 2006 aimed to assist the EMB-DENR to enhance its capacity to promote CDM projects in the Philippines. The program included assistance in the formulation of CDM promotion measures and establishment of a helpdesk and information clearinghouse.

Klima implements a number of CDM capacity building programs. Its program *Developing Local, National and Regional Capacities to Sustain Climate Change Initiatives in the Philippines and East Asia (DEVCAP)* aims to develop the national and regional capacities of government, civil society, and the private sector to actively participate in the global effort to address climate change. DEVCAP is funded by USAID in collaboration with the Inter-Agency Committee on Climate Change (IACCC). Another initiative, the *Philippine Greenhouse Gas Accounting and Reporting Program (PhilGARP)* is a voluntary program for GHG accounting and reporting designed to train businesses and organizations operating in the Philippines on GHG management, and assist them in the creation of corporate GHG inventories. PhilGARP is a collaboration among DENR, DOE, the World Resources Institute (WRI), the World Business Council for Sustainable Development (WBCSD), the Philippine Business for the Environment (PBE), and Klima.

Klima itself is also offering its CDM services through training programs and briefings to various sectors and agencies.

A World Bank-funded program launched in February 2007, *Capacity Building for CDM Project Development Activities (Carbon Finance Assist Program)*, aims to reduce barriers to CDM project development through three-pronged technical assistance: (i) Sector studies that assess CDM opportunities in key sectors (fuel switching, waste management, industry and land use, land-use change, and forestry) and develop sector-based approaches to CDM compliance; (ii) Support intermediaries by working with key organizations (such as government financial institutions, and NGOs) to assess their potential for brokering or acting as technical, financial, and administrative intermediaries for small-scale projects and develop business models for these groups; and (iii) Project pre-assessment to identify and undertake pre-assessments of potential CDM projects from both sector studies and intermediary support activities. The World Bank may or may not purchase the emission reduction credits that would be generated by these projects from its carbon funds.

5.2.2. Completed Programs

A previous phase of *Integrated Capacity Strengthening for the CDM program* conducted in 2004-2006 focused on providing training workshops for both the government and private sector in the host countries on CDM project formulation. Another output of the program was the publication of the CDM country guide for the Philippines.

The Philippines was among the 12 countries participating in the *Capacity Development for the Clean Development Mechanism (CD4CDM)* program implemented by the Risø Centre for the United Nations Environment Programme (UNEP). The program aimed to develop national capabilities in the technical and financial analysis of projects and in negotiating possible finance agreements with Annex I signatories to UNFCCC or investors. The focal point for the CD4CDM project was the IACCC, with technical support from Klima. The technical assistance from the program included a tutorial course on developing CDM PDDs and inclusion of the CDM projects in the promotional activities of CD4CDM, like the 2004 Manila Carbon Forum and the 2005 Carbon Expo held in Cologne, Germany.

Other completed projects include the *Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS)* carried out in 1995-1998 under a regional technical assistance executed by ADB and funded by GEF through the United Nations Development Programme (UNDP). ALGAS aimed to help the Philippines and 11 other participating countries develop the capability to measure GHG emissions and undertake climate change mitigation programs. GEF, through UNDP, also funded a series of programs aimed at helping the Philippines prepare and submit its first and second National Communication Programs to UNFCCC.

The *CDM Support Program for the Philippines*, funded by the New Energy and Industrial Technology Development Organization (NEDO) of Japan, conducted a Technology Transfer Research and Needs Assessment and supported the implementation of five CDM project feasibility studies in the country. The *WSSD Type II – Asia Capacity Building Initiative*, with financial assistance from the Japanese Ministry of Economy, Trade and Industry aimed to enhance the capacity of officials and staff of the Philippine DNA for CDM, including the National Solid Waste Management Commission Secretariat, acting as the technical evaluation committee (TEC) on waste management, and the Department of Energy, serving as the TEC for energy and energy efficiency.

6. DONOR ACTIVITY IN CLEAN ENERGY

The official development assistance (ODA) portfolio for the Philippines had a total commitment of US\$10.2 billion as of December 2005. The majority of these funds go to the infrastructure sector, which includes transportation as well as energy, power, and electrification. In 2005, the infrastructure sector received US\$6.6 billion, or 65 percent of the total ODA portfolio, of which the transportation sector had the highest share (50 percent). The energy, power and electrification sector got the lowest share (around 4 percent). **Table 5** identifies the key ODA agencies in the Philippines and the corresponding programs and projects that they have implemented since early 2000. The next section briefly discusses these programs by fuel sector.

TABLE 5: SUMMARY OF ODA ACTIVITY AND PROJECTS IN CLEAN ENERGY

Donor	Programs/Projects
The World Bank (WB)	<ul style="list-style-type: none"> • Capacity Building for CDM Project Development Activities (Carbon Finance Assist Program, 2007) • Rural Power Project (2004-2009) • Support for Strategic Local Development and Investment (2006-2012) • Laguna de Bay Community Carbon Finance Project (Carbonshed Project, 2006-) • Electric Cooperative System Loss Reduction Project (2004-2011)
Asian Development Bank (ADB)	<ul style="list-style-type: none"> • Renewable Energy and Livelihood Development Project in Negros Occidental (2004-2008) • Rehabilitation of Renewable Energy Projects for Rural Electrification and Livelihood Development (2003-2005) • Mindanao Basic Urban Services Sector Project (MBUSS, 2002-2007) • Metro Manila Air Quality Improvement Sector Development Program • Institutional Strengthening for the Development of the Natural Gas Industry (2003-2006)
United Nations Development Programme (UNDP)	<ul style="list-style-type: none"> • Capacity Building to Remove the Barriers for the Development of Renewable Energy Projects (CBRED, 2003-2008) • Philippine Efficient Lighting Market Transformation Project (PELMATP, 2005-2010) • PV-Wind Diesel Hybrid System (2001-2004) • Renewable Energy-based Village Power System
Japanese International Cooperation Agency (JICA)	<ul style="list-style-type: none"> • Sustainable Improvement of Renewable Energy Development in Village Electrification (2004-2009) • Japan Grass Roots Grand Aid Program • Mahagnao Micro-Hydro Demonstration Project (2001-2005) • Electrification of Upland Dwellers in Northern Luzon
Japan Bank for International Cooperation (JBIC)	<ul style="list-style-type: none"> • Environment Infrastructure Support Credit Program (closed in 2006) • Local Government Units Support Credit Program (2000-2005) • North Luzon Wind Power Project • Tongonan Geothermal Power Plant Construction • Tiwi Geothermal Power Plant Complex Rehabilitation
United States Agency for International Development (USAID)	<ul style="list-style-type: none"> • Alliance for Mindanao Off-Grid Renewable Energy (AMORE I, 2002-2009) • Philippine Environmental Governance (ECOGOV 2, 2004-2009) • Energy and Clean Air Project (ECAP, 2004-2008) • Alliance for Mindanao Off-Grid Renewable Energy (AMORE, 2004-2009) • Sustainable Energy Development Project (SEDP, 1999-2008) • Developing Local, National and Regional Capacities to Sustain Climate Initiatives in the Philippines and East Asia (KLIMA, 2000-2007) • Sustainable Energy Development Project (1999-2006)

TABLE 5: SUMMARY OF ODA ACTIVITY AND PROJECTS IN CLEAN ENERGY

Donor	Programs/Projects
USAID	<ul style="list-style-type: none"> • Developing Local, National, and Regional Capacities to Sustain Climate Initiatives in the Philippines and East Asia (2000-2005) • Philippine Energy Partnership Program (PEPP, 1998-2007)
EC-ASEAN Energy Facility (EAEP)	<ul style="list-style-type: none"> • Feasibility study for distributed generation and renewable energy portfolio of a distribution utility: A case study in the Philippines (2005-2006) • Increasing access to local sources of financing for renewable energy investments and design of innovative financing instruments: case study in the Philippines, exchanging experiences with Thailand, and applicability of European approaches (2005-2006) • Capacity Building for Calaca, Batangas Local Governments Unit, Public Market Vendors and Households to Operate a Biogas Facility: Learning from European and ASEAN/Thai Best Practices (2006) • Capacity Building for Wind Project Developers, Providers of Engineering Consulting Services and Government Planners on the Conduct of Project Preparatory Activities for the Development of Wind Power Projects in the Philippines and Vietnam and Adopting European and International Standards (2006) • Innovative Financial Scheme for Sustainable Development of Renewable Energy Projects in Rural Areas in Vietnam, the Philippines, and Indonesia (2004-2006) • Rice Husk Power Plants in Indonesia, the Philippines, and Vietnam (2004-2005)
EC EU-ASIA PRO ECO	<ul style="list-style-type: none"> • Biowaste Reuse in Southeast Asian Cities (2005-2006) • Greening the Philippine Industries with the ECOPROFIT Approach: Regional partnership, capacity building and training program approach for the industries within the Central Luzon Region in the Philippines (2006-2008)
Danish International Development Agency (DANIDA)	<ul style="list-style-type: none"> • 25-MW Northwind Bangui Bay Wind Power Plant (2004-)

Source: USAID ECO-Asia Clean Development and Climate Program, 2006.

6.1. RENEWABLE ENERGY

A survey of ODA clean energy portfolio in the Philippines shows that donors have focused their assistance on renewable energy, in particular for power generation and electrification. Many of the ODA programs and projects support the development of renewable energy projects within the framework of infrastructure investment loan programs for local government units. The World Bank's recently launched *Support for Strategic Local Development and Investment* program provides loans through the Land Bank for infrastructure projects identified by local government units to enable them to comply with the requirement for municipal solid waste management plans. The Land Bank also implements the lending component of ADB's *Mindanao Basic Urban Services Sector Project*, while the Department of Interior and Local Government manages the capacity building components.

Many of the renewable energy projects are dedicated to off-grid rural electrification of remote communities, and are combined with livelihood activities. ADB, UNDP, and JBIC have such projects, which target the electrification of specific rural communities. USAID's program, the *Alliance for Mindanao Off-Grid Renewable Energy (AMORE)*, has already provided electricity access to close to 300 barangays in Mindanao using solar home systems, solar PV charging stations, and micro-hydro facilities.

Some renewable energy projects are for small to large-scale on-grid applications, most of which include a CDM or carbon market component. This category includes the *North Luzon Wind Power Project*, which is partly funded by JBIC, and the *25 MW Northwind Bangui Bay Power Plant*, which is mainly financed by DANIDA. The emission reduction credits that would be generated by these projects will be purchased by the World Bank's carbon funds.

A number of the renewable energy based ODA projects focus on capacity building to remove barriers for developing and financing renewable energy projects. UNDP's five-year *Capacity Building to Remove Barriers in Renewable Energy Development* (CBRED) project aims to increase the capacity of various stakeholders of renewable energy development, from policy-makers to project developers and financiers. The European Commission through the EU-ASEAN Energy Facility has financed projects to build the capacity of local financial institutions, project developers, and local government units for undertaking renewable energy projects.

Other renewable energy-based ODA projects fall into one or two of the above-mentioned categories. For instance, the World Bank's *Rural Power Project*, which is implemented by the DBP, provides loans to small-scale off-grid and on-grid renewable energy projects and has a capacity building component for electric cooperatives, local government units, and other potential private sector investors. The EU-ASEAN Energy Facility has also financed a project to undertake feasibility studies of renewable energy-based distributed generation projects.

6.2. CLEAN TRANSPORT

Through the Metro Manila Air Quality Improvement Sector Development Program, ADB is supporting both infrastructure investment and capacity building needs of Metro Manila to implement its Air Quality Action Plan. USAID, through the *Energy and Clean Air Project* (ECAP), is supporting the country's energy, environment, and transport agencies to improve policy frameworks and increase awareness on clean energy and transport. ADB's technical assistance on the *Institutional Strengthening for the Development of the Natural Gas Industry* aims to strengthen the institutional capacity of the Department of Energy to promote the development of the natural gas downstream industry.

6.3. ENERGY EFFICIENCY

A few ODA projects promote energy efficiency either in the demand or supply side. The World Bank's *Electric Cooperative System Loss Reduction Project* supports investment and aims to strengthen capacity of electric cooperatives in the country to improve energy efficiency in distribution. The UNDP is running the GEF-funded *Philippine Efficient Lighting Market Transformation Project* (PELMATP), a five-year program to remove barriers for the widespread utilization of energy efficient lighting systems. The EC through the EU-Asia Pro Eco Program is funding a project to increase the capacity of selected Philippine industries to adopt the ECOPROFIT approach.

7. BARRIERS AND NEEDS ASSESSMENT IN CLEAN ENERGY

Understanding the barriers to scaling-up clean energy projects in the Philippines requires a more exhaustive study. The following are very preliminary views on the possible barriers based on insights gathered from consultations with stakeholders and key institutions in the Philippines.

Energy Efficiency

- Lack of legislation or regulations to require industrial and commercial establishments to implement energy efficiency and also to provide incentives to utilities to implement demand-side management projects.
- Inadequate institutional capability (government agencies do not have enough manpower and perhaps should leave energy audits to ESCOs/private sector; they need a more scientific approach in estimating savings potential).
- Proponents lack the capacity to prepare bankable projects, let alone to explore the potential of EE projects for carbon finance, even if there are local banks offering financing for EE projects.

Renewable Energy

- Lack of market-based mechanisms, such as feed-in tariffs or special rates for renewable energy.
- No obligation or incentive to generators to source their power supply from renewables.
- Small projects are uneconomic, but markets or off-takers are also small, particularly distribution utilities.
- Lack of incentives for local manufacturing of equipment.
- Insufficient institutional capability of regulators to deal with specific issues in renewables.

Alternative Fuels

- For CNG – need transmission and distribution infrastructure to deliver a reliable supply of gas; this should ultimately make gas cheaper, to be able to compete with diesel and eliminate the need for subsidies.
- For biodiesel and bioethanol – legislation has been passed to enforce blending of locally produced biofuels in motor fuels sold by oil companies, but adequate supply and infrastructure need to be in place, including product testing facilities and fuel and vehicle standards.

8. CONCLUSIONS

Interest in clean energy development in the Philippines is not a recent phenomenon. The search for new and renewable sources of energy and energy efficiency started in the aftermath of the first oil crisis in the early seventies. There had been a lull with the relatively low oil prices in the early 1990s, coupled with frustrations from the failure of past programs (e.g., Alcogas from sugar cane ethanol) to mainstream renewable energy into the country's energy supply base. During the past decade there has been a resurgence of interest in clean energy in the Philippines, not only because oil prices have rallied to crisis or near-crisis proportions but because of the growing realization of the negative environmental impact of energy use, particularly on climate change. The development of mechanisms to monetize carbon emissions has also provided an added impetus to pursue clean energy projects. Market reforms, particularly the privatization of generation assets of the government, are also opening up opportunities for the private sector in large-scale RE development.

8.1. RECOMMENDATIONS FOR A CLEAN ENERGY STRATEGY

Drawing from insights gathered during the stakeholder consultations and the above review of the policy and regulatory framework, institutions, accomplishment, plans and programs, and barriers to scaling-up clean energy, the following areas for priority action were identified:

Renewable energy

- supplementary regulations to the proposed RE laws and detailed rules for implementing the proposed measures such as the *Renewable Portfolio Standard (RPS)*, *Renewable Energy Market*, *Net metering agreements*, etc.;
- fiscal incentives such as tax equalization between indigenous and imported fuels;
- non-power uses of geothermal and ocean technology resource assessment; and
- developing biomass and other clean energy roadmaps, addressing technical and policy issues, and related issues such as land use, food vs. fuel, etc.

Energy efficiency

- enforcement of standards and energy audits and incentives for utilities to implement demand-side management;
- import duty reductions on EE and RE equipment and other incentives;
- harmonization of standards for EE and RE equipment and capacity building for regulators and manufacturers; and
- capacity building for planners on energy end-use modeling and data collection.

Clean Transport

- supplementary regulations to the newly passed Biofuels Act;
- harmonization of biofuels and vehicle standards to promote free trade; and
- licensing and regulatory approaches for CNG infrastructure and development of natural gas vehicle and fuel standards.

8.2. RECOMMENDED ACTIVITIES

Corresponding to the potential areas for scaling-up and enhancing clean energy policies described above, the following are some specific activities that might be pursued by energy sector stakeholders in the region (summarized in Table 6 below).

Regional platform for energy policy action research: A regional program to support energy policy action research, modeled on the Thailand Energy Policy Research Project being carried out by JGSEE (www.thaienergy.org).

- **Network on clean energy regulation:** Developing consistent and transparent regulatory and legislative frameworks for clean energy. Provide expert assistance or organizing regional forums to present case studies in EE, RE and alternative fuels.
- **Remove barriers to free trade of clean energy:** Develop clearinghouse and targeted courses of workshops addressing national and regional implications of measures such as tax incentives and import duty reductions on EE/RE equipment; harmonization of biofuels and vehicle standards; and EE and RE equipment.
- **Joint development of clean energy roadmaps and action plans:** Hands-on project and in-depth training with occasional regional forums to present and compare country progress in developing biomass action plans and other clean energy roadmaps.
- **Regional Information Network:** Develop and maintain a “one-stop shop” for information on Clean Energy. This could be in the form of an online “clean energy” portal with a compendium of

policies, laws, and regulation; reports and studies; information on projects, technology, equipment, and suppliers, etc. The portal could also host an e-group, and e-conferences and webcasts.

TABLE 6: RECOMMENDED AREAS OF CLEAN ENERGY ACTIVITIES IN THE PHILIPPINES

Activity	Potential Implementing Partners/Stakeholders
<i>Regional program to support clean energy policy action research</i>	
1. Training for government officials and the private sector on identification of climate change mitigation potential and mitigation technology assessment	DOE, EMB/IACC, USAID Mission/Manila, KLIMA, PEI, ECAP
2. Training on LEAP: for forecasting and scenario analysis of energy demand and GHG emissions vs. clean energy policies, including end-use data collection and calculation of emission factors	DOE Planning Bureau, DENR/EMB/IACC MO/KLIMA, ECAP
<i>Network on clean energy regulation</i>	DOE, DENR/EMB, ENMAP, REAP, ECAP, PEI
<i>Remove barriers to free trade of clean energy</i>	
1. Harmonization of standards for EE and RE equipment <ul style="list-style-type: none"> o Capacity building for manufacturers to diffuse concerns about meeting standards o Capacity building for regulators/policy-makers 	DOE-EUMB, BPS, PCIIRD, ENMAP, REAP, PEI, ECAP
<i>Joint development of clean energy roadmaps and action plans</i>	
1. Biomass roadmaps and biomass utilization plans	ENMAP, REAP, PEI, ECAP
2. Ocean technology: resource assessment (with Indonesia)	REAP, MO
3. Geothermal: resource assessment/R&D on non-power uses	DOE, PNOC-EDC
<i>Regional Information Network</i>	
1. One-stop shop for information on Clean Energy - compendium of policies, laws, and regulation; abstracts of reports and studies; information on projects, technology, equipment, suppliers, etc.	DOE-EUMB, PCIIRD, DENR/EMB, ECP, ENMAP, REAP, PEI, CBRED, ECAP
2. E-group and e-conferences/ web casts on Clean Energy	

Source: USAID ECO-Asia Clean Development and Climate Program, 2006.

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