A. INTRODUCTION

Renewable energy (RE) resources are becoming increasingly important in the government’s thrust to reduce dependence on fossil fuels and harmful emissions that affect health and the environment.

RE includes biomass, geothermal, hydro, wind, solar and ocean energy which can be converted into more useful energy like electricity. These sources of energy are renewable on a regular basis and their renewal rates are relatively rapid to consider their availability over an indefinite period of time.

The utilization of RE contributes to the government’s strategy to attain a 60 percent self-sufficiency level for total primary energy by 2010. At present, geothermal, hydro and biomass resources provide a combined 42 percent share. On the other hand, wind, solar and micro-hydro resources are getting wide-scale use, particularly for electrification in remote areas.

B. RENEWABLE ENERGY SOURCES

**Biomass**

Biomass refers to a non-fossilized, biodegradable organic material. In the Philippines, biomass technology varies with the use of biogas, bagasse, rice hull, coconut husks and shells, wood chips/residues and other agri-wastes.

Landfill waste is another source of biomass. Urban centers like in Metro Manila, Cebu and Davao dispose substantial volumes of biodegradable domestic wastes. Several waste-to-energy projects that use methane gas generated and captured from the landfills were approved by the Board of Investments.

**Hydropower**

Hydropower is mostly derived from the potential energy of dammed water which is harnessed to turn a water turbine that further drives a generator that produces electricity. Hydropower plants are classified based on their capacities, as follows:

- Micro-hydro - 1 to 100 kW
- Mini-hydro - 101 kW to 10 MW
- Large hydro - more than 10 MW

The Philippines has many rivers, lakes, waterfalls, irrigation canals, springs, ponds and other water bodies that have vast hydropower potential. Depending on the volume and kinetic energy of the falling or running water many of these water sources are technically feasible for development of micro- mini- or large hydropower projects.

**Geothermal**

Geothermal power is derived from thermal energy, usually occurring in deep reservoirs of hot fluids within the earth's crust. Unlike other types of renewable energy, geothermal energy is considered a mineral resource and upstream geothermal activities are essential to start a geothermal power project. These activities include the exploration of geothermal areas which involves a drilling program and a well field construction and extraction of steam from the area. There are four elements in a geothermal system, namely:

1. Heat source - which is the magma that comes close to the surface of the earth in volcanic areas
2. Permeable underground reservoir rock - which can hold or store water
3. Solid cap rock - which maintains pressure and does not allow the heat, water or steam to escape
4. Water - which serves as the medium for carrying the heat

The presence of a geothermal resource is indicated by volcanoes, hot springs, fumaroles (an opening on earth’s crust which emits steam and gasses) and solfataras (volcanic area that gives off sulfurous gases and steam). Due to its location in the “Ring of Fire”, the Philippines is one of the largest producers of geothermal energy in the world (second only to the US in terms of installed capacity).

Wind Energy

Wind energy is derived from wind that is converted into useful electrical or mechanical energy. Like old-fashioned windmills, today’s wind machines (i.e., wind turbines) use blades that are rotated by the wind’s kinetic energy. The blades are connected to a drive shaft that turns an electric generator to produce electricity.

Solar Energy

Solar energy is derived from solar radiation which is converted into useful electrical or thermal energy. Solar power systems can be classified into two general categories – Photovoltaic (PV) and Concentrating Solar Power (CSP) systems. A PV system that converts solar energy into an electrical energy includes a solar photovoltaic plant that uses polycrystalline silicon solar panels exposed on a wide area.

Ocean Energy

Ocean energy is derived from ocean or tidal current or wave energy that is converted into useful electrical or mechanical energy. Due to its archipelagic nature, the Philippines has a big potential for ocean energy where the potential theoretical capacity is estimated to be about 170,000 MW.

C. POWER GENERATING CAPACITY

Installed Capacity

As of 2010, the total installed capacity of the Philippines’ power generating plants was recorded at 16,359 MW. The largest share was attributed to coal-fired power. Hydro and geothermal power plants are making substantial shares. Other renewable energy such as wind, solar, and biomass still account for less than 1 percent of the total generation capacity.

2010 Installed Generation Capacity

Source: Power Statistics 2010, DOE
D. POWER DEVELOPMENT SCENARIO

The following shows the progressive energy requirement of the Philippines until 2030:

**Additional Capacities, 2009 - 2030**
(Renewable and Non-Renewable Energy)

![Map of Philippines with energy zones]

**Total Additional Capacity Needed - 16,550 MW**

The total target capacities for RE are as follows:

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>2008 EXISTING CAPACITY (MW)</th>
<th>TARGET CAPACITY</th>
<th>TOTAL IN 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal</td>
<td>2,027</td>
<td>1,070</td>
<td>3,097</td>
</tr>
<tr>
<td>Hydro</td>
<td>3,367</td>
<td>3,400</td>
<td>6,767</td>
</tr>
<tr>
<td>Wind</td>
<td>33</td>
<td>515</td>
<td>548</td>
</tr>
<tr>
<td>Solar</td>
<td>5</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Biomass</td>
<td>68</td>
<td>200</td>
<td>268</td>
</tr>
<tr>
<td>Ocean</td>
<td>0</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td>5,500</td>
<td>5,355</td>
<td>10,235</td>
</tr>
</tbody>
</table>

**RE Projects for Partnership/Private Sector Participation**

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>(MW)</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>638</td>
<td>o 8 projects ranging from 7 MW to 360 MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Estimated project cost of US$ 932 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Implementation Schedule : 2012 - 2020</td>
</tr>
<tr>
<td>Geothermal</td>
<td>200</td>
<td>o 5 projects at 40 MW each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Estimated project cost of US$ 1 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Implementation Schedule : 2013 - 2019</td>
</tr>
<tr>
<td>Wind</td>
<td>213</td>
<td>o 6 projects ranging from 5 MW to 46 MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Estimated project cost of US$ 575.5 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Implementation Schedule : 2011 - 2014</td>
</tr>
<tr>
<td>Biomass</td>
<td>172</td>
<td>o 7 projects ranging from 14.5 MW to 35 MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Estimated project cost of US$ 247 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Implementation Schedule : 2012 - 2017</td>
</tr>
</tbody>
</table>

E. PHILIPPINE ADVANTAGE

Support infrastructure

- High voltage backbone system of interconnected transmission lines, sub-stations and related facilities exist in Luzon and Visayas, and another in Mindanao. The transmission lines traversing the entire country have a total line length of 19,778 circuit kilometers, while the total sub-station capacity is at 24,643 megavolts amperes (MVA)

<table>
<thead>
<tr>
<th>GRID</th>
<th>SUBSTATION CAPACITIES (MVA)</th>
<th>CIRCUIT KILOMETER (ckt-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luzon</td>
<td>19,271</td>
<td>9,527</td>
</tr>
<tr>
<td>Visayas</td>
<td>3,269</td>
<td>4,745</td>
</tr>
<tr>
<td>Mindanao</td>
<td>2,103</td>
<td>5,506</td>
</tr>
<tr>
<td>Total</td>
<td>24,643</td>
<td>19,778</td>
</tr>
</tbody>
</table>

- National Grid Corporation of the Philippines (NGCP) is responsible for the planning, construction and centralized operation and maintenance of high-voltage transmission facilities, including grid interconnection and ancillary services

Human resources

- Manpower Requirement
  - Engineers
  - Plant Operators
  - Maintenance personnel
  - Administrative staff

- Monthly Salary Range
  - Engineers – US$ 833 to US$ 854
  - Chemists – US$ 688 to US$ 750
  - Plant Operators – US$ 458 to US$ 479
  - Maintenance Personnel – US$ 438 to US$ 458
  - Administrative Staff – US$ 583 to US$ 625

- Availability
  - Substantial number of graduates from various engineering and technical/vocational courses

- Quality
  - competitive labor force
  - fast learning curve
  - long tradition of excellence in the professions
  - strong work ethics

F. FISCAL AND NON-FISCAL INCENTIVES (R.A. 9513)

Fiscal incentives for RE developers

1. Income Tax Holiday (ITH) for the first seven (7) years of commercial operations

2. Duty-free Importation of RE machinery, equipment and materials including control and communication equipment within the first ten (10) years upon issuance of a certification of entitlement to incentives
3. Special tax rates on realty and other taxes on civil works, equipment, machinery, and other improvements actually and exclusively used for RE facilities not to exceed one and a half percent (1.5%) of their original cost less accumulated normal depreciation or net book value

4. Net Operating Loss Carry-Over (NOLCO) during the first three (3) years from the start of commercial operation which had not been previously offset as deduction from gross income shall be carried over as a deduction from gross income for the next seven (7) consecutive taxable years immediately following the year of that loss

5. Corporate Tax Rate of ten percent (10%) on net taxable income after ITH

6. Accelerated Depreciation of plant, machinery, and equipment that are reasonably needed and actually used for the exploration, development and utilization of RE resources (Depreciation rate not to exceed twice the normal rate)

7. Zero Percent Value – Added Tax Rate on sales of fuel or power generated from renewable sources

8. Tax Exemption on all proceeds from the sale of carbon emission credits

9. Tax Credit on RE machinery, equipment, materials, and parts purchased from a domestic manufacturer, equivalent to one hundred percent (100%) of the value of the VAT and custom duties that would have been paid had these items been imported.

Non-Fiscal Incentives

1. Renewable Portfolio Standard (RPS) - refers to a market-based policy that requires electricity suppliers to source an agreed portion of their energy supply (in on-grid systems) from eligible RE sources

2. Feed-in Tariff (FIT) - refers to a renewable energy policy that offers guaranteed payments on a fixed rate per kilowatt-hour for emerging renewable energy sources, excluding any generation for own use. This policy includes but is not limited to the following rules:
   a. Priority connection to the grid
   b. Priority purchase and transmission of and payment for by grid system operators
   c. Guaranteed payment of fixed tariff for at least 12 years

Other Privileges

1. Exemption from the Universal Charge under the following circumstances:
   a. If the power or electricity generated through the RE System is consumed by the generators themselves; and/or
   b. If the power or electricity through the RE System is distributed free of charge in the off-grid areas

2. Cash incentive of RE Developers for Missionary Electrification – cash generation-based incentive per kilowatt-hour rate generated, equivalent to 50% of the universal charge for the power needed to service missionary areas where the RE Developer operates, to be chargeable against the universal charge for missionary electrification

3. Payment of transmission Charges – option to pay the transmission and wheeling charges of TRANSCO, its concessionaire or its successor-in-interests on a per kilowatt-hour basis at a cost equivalent to the average per kilowatt-hour rate of all other electricity transmitted through the grid of a registered RE Developer producing power and electricity from an intermittent RE Resources
4. **Priority and Must Dispatch for Intermittent RE Resource** – Qualified and registered RE generating units with intermittent RE Resources shall be considered “must dispatch” based on available energy and shall enjoy the benefit of priority dispatch

G. **GOVERNMENT SUPPORT**

**Enabling law**

- Renewable Energy Act of 2008 (R.A. 9513)
  - establishes the necessary infrastructure and mechanisms to carry out the government’s thrust to promote the development, utilization and commercialization of renewable energy sources
  - promotes the purchase, grid connection and transmission of electricity generated from renewable energy sources to ensure its market
  - provides incentives such as exemption from various taxes and duties to make investments more attractive

**Market support**

- Diversification of energy supply to contribute to the growth of the renewable energy industry
- Renewable Portfolio Standards (RPS) policy which requires electricity suppliers to source a certain portion of their energy supply from eligible RE developers
- Feed-in Tariff for electricity produced from eligible RE resources

**Financial support**

- Development Bank of the Philippines (DBP)
  - World Bank Rural Power Projects (WB-RPP)
  - Environmental Development Program - Japan Bank for International Cooperation (EDP JBIC 6)
  - New and Renewable Energy Financing Program (NREFP)
- Land Bank of the Philippines (LBP)
  - CBRED Project Preparation Fund
  - Carbon Finance Support Facility (CFSF)
  - Renewable Energy for Wiser and Accelerated Resources Development (REWARD)
  - KfW – Credit Line for Energy Efficiency and Climate Protection
- Philippine Export-Import Credit Agency (PhilEXIM)

H. **CONTACTS**

**Board of Investments (BOI)**
Industry and Investments Bldg.
#385 Sen. Gil Puyat Ave., Makati City
Tel. Nos.: 897-6682, 890-9308
[www.boi.gov.ph](http://www.boi.gov.ph)
Department of Energy (DOE)
Investments Promotion Office (IPO)
Tel. No.: 840-2255
Renewable Energy Management Bureau
Tel. No.: 840-1817
Merritt Road, Fort Bonifacio, Makati City
www.doe.gov.ph

Energy Regulatory Commission (ERC)
Pacific Center Building
San Miguel Avenue, Ortigas Center, Pasig City
Tel. No.: 914-5000 local 114