

HARNESSING THE POTENTIAL OF THE PHILIPPINE RENEWABLE ENERGY

Renewable Energy Market Situationer

Renewable energy is energy generated from natural resources which are replenished in a short period of time. The renewable energy most often used are geothermal, hydro, solar, wind, ocean and biomass.

The world's renewable energy sector has been growing substantially in the last four years. Much of its growth is attributed to favorable policies amidst increasing concerns over climate change and energy security. In 2008, a number of governments enacted new policies and at least 73 countries have set ambitious renewable energy targets, up from 66 countries in the previous year. In addition, several countries have also directed their stimulus funding to counteract the global recession to new green jobs in the renewable energy sector, which include the \$150 billion investment of the US in renewable energy over the next ten years.

In 2008, the world's total installed capacity reached 1,128 GW, with around 40 GW (excluding large hydro power) added in that year alone. Large hydro power plants comprised approximately three quarters of total installed capacity and wind with around 11%. Nonetheless, renewable energy comprised a miniscule 6.2% (or 18% if large hydro power is included) of world's total energy capacity and 4.4% of generation.

The installation of solar power grew at an impressive rate of 600% since 2004, 250% for solar power and 75% for small hydro power. China topped the list of countries for installing renewable energy. It was followed by the United States, Germany, Spain and India. Notably, China doubled its wind power capacity for the fifth year in a row. Likewise, the growth of grid in solar PV in Spain was five times higher compared in 2007.

In terms of investments, the renewable energy sector attracted more than \$120B in 2008, at least four times more than in 2004. Developed economies raked in \$82.3B of new investments, a 1.7% decline from 2007. Conversely, new investments in developing economies climbed by 37% to \$36.6B. For the first time, new investments in renewable energy surpassed the investments in fossil-fuel technology by \$10B.

Box 1. Renewable Energy Sources & Technologies

Renewable Energy	Technology & Application
Solar	<ul style="list-style-type: none"> • Photovoltaic (PV) cells to produce electricity • Solar thermal system for heating water
Wind	<ul style="list-style-type: none"> • Wind turbine: single turbines or a number of turbines in a wind farm • Conventional windmill to pump water
Water	<ul style="list-style-type: none"> • Hydro electric, wave and tidal systems to produce electricity
Biomass	<ul style="list-style-type: none"> • Direct combustion of gas produced from biomass or biogas to generate electricity or heat
Geothermal	<ul style="list-style-type: none"> • Using the temperature of the earth to produce electricity or heat

In the Philippines, renewable energy sources contribute 43% to the country's primary energy mix, one of the highest in Southeast Asia. In Indonesia and Thailand, RE only contributes 33% and 12% in their energy mix, respectively.

The Philippines has an existing capacity of 5,500 MW of renewable energy power. Out of which, 61% is hydro power and 37% is geothermal power. The Philippines is the second largest geothermal producer in the world, next only to the United States.

Table 1. Renewable Energy Power, 2008

Resource	Existing Capacity (MW)	Target
Geothermal	2,027	1,070
Hydro	3,367	3,400
Wind	33	515
Solar	5	30
Biomass	68	200
Ocean	0	120
Total	5,500	5,355

Source: Department of Energy (DOE)

The Philippines has vast potential of renewable energy sources. Estimates by the Department of Energy (DOE) shows that the country has at least 250,000 MW of renewable energy potential. Notably, the Philippines has 170,000 MW of untapped ocean energy potential and 76,600 MW of wind energy potential. As a tropical country, the Philippines has untapped vast potential of solar energy.

Nonetheless, existing capacity of ocean, solar and wind (OSW) energy as well as biomass in the country is still low. As of 2008, the Philippines only generated 68 MW of renewable energy from biomass, 33 MW from wind and 5 MW from solar.

Table 2. Renewable Energy Potential

Resource	Potential Capacity (MW)
Geothermal	1,200
Hydro	10,500
Wind	76,600
Solar	Untapped vast potential
Biomass	235.7
Ocean	170,000

Source: Department of Energy

Outlook on the Renewable Energy Market

Renewable energy is expected to play a significant role in the power sector in the coming years. By 2030, the International Energy Agency (IEA) projected renewable energy to supply over a quarter of the world's electricity requirements. Growth in renewable energy will mostly come from non-hydro renewables.

Table 3. Growth of Renewable Energy, 2030

Electricity Generation	2030	Approximate Increase (times)
Total	7,775	>2
Hydropower	4,903	<2
Biomass	983	>4
Wind	1,440	18
Solar	238	60
Geothermal	185	>3
Ocean	25	46

Source: International Energy Agency (IEA)

In the Philippines, the implementation of the Renewable Energy Act of 2008 is expected to renew interest in the renewable energy sector. The Department of Energy expects renewable energy power to double in the next ten years and to bring in as much as \$27B in new investments in the next 20 years.

Of the \$27B, the DOE expects Luzon to draw in \$16.14B, which may be used to produce 8,072 MW of electricity from renewable energy. Meanwhile, Visayas is expected to attract some \$4.9B in investments to produce 2,442 MW of renewable energy and Mindanao, \$5.93B for 2,963 MW.

The Philippines Renewable Energy Policy Framework (REPF) targets to increase non-power contribution of renewable energy to the energy mix by 10 million barrels of fuel oil equivalents (MMBFOE) by 2012. REPF also aims to overtake the United States as the # 1 geothermal producer in the world with the addition of 1,070 MW in capacity. Likewise, the Philippines targets to become the number 1 wind energy producer in Southeast Asia with the addition of 515 MW in capacity. Over the same period, the Philippines will double its

hydropower capacity with the addition of 3,400 MW. Renewable energy from biomass, solar and ocean are also expected to expand by 200 MW, 30 MW and 120 MW, respectively.

Box 2 EDC: World's top geothermal producer

Energy Development Corp. (EDC) is poised to become the world's top geothermal producer as it assumes the operation of the Palinpinon and Tongonan geothermal power plants which it won in the PSALM auction last September.

EDC's acquisition of the 192.5 MW Palinpinon and 112.5 MW Tongonan plants will boost the company's generating capacity to 1,650 MW. The firm is expected to surpass US energy firm Chevron, which produces 1,273 MW of geothermal energy annually, as top geothermal producer in the world.

In addition to these, EDC also operates the Unified Leyte plants consisting of the 125 MW Upper Mahiao, 232.5 MW Malitbog, 180 MW Mahanagdong and the 51 MW Optimization plants. In Mindanao, EDC runs the 106 MW Mindanao 1 and 2 plants. EDC's first fully-owned power plant is the 49 MW Northern Negros geothermal plant in Negros Occidental.

For the last three years, EDC posted positive returns. Despite weaker electricity and steam sales in 2007, EDC net income rose 22% to P8.8B, largely due to foreign exchange savings. However, in 2008, the company's profit dropped by a staggering 85% as the result of having to mark-to-market EDC's loans in a volatile Japanese yen situation. EDC had Y12 billion Japanese loan maturing in June 2009.

	2006	2007	2008	Sept-09
Total Assets	77,392.5	71,989.7	69,345.6	73,158.8
Total Liabilities	50,017.7	37,457.3	40,610.3	44,802.1
Stockholders' Equity	27,374.7	34,532.4	28,735.3	28,356.7
Total Revenues	25,721.7	19,000.6	20,526.9	15,986.7
Net Income	6,863.3	8,768.2	1,343.3	1,388.9
ROE	35.6%	28.3%	4.3%	4.9%
ROA	9.3%	11.7%	1.9%	2.0%

Source: EDC website; *Amounts in million PhP

The year 2008 was an important milestone for the Philippine renewable energy sector. After rough sailing and being bypassed by five Congresses, the Renewable Energy Act of 2008 (RA 9513) was signed into law. The RE law seeks to spur investments in the renewable energy sector and to make the country 60% energy self-sufficient by 2010.

The RE law, which was deemed as the first and most comprehensive renewable energy law in Southeast Asia, is expected to further strengthen the country's foothold in the renewable energy market. The RE law seeks to accelerate the exploration and development of renewable energy resources, increase its use and promote its efficient and cost effective commercial application by providing fiscal and non-fiscal incentives.

The following are the incentives under the law:

Production Incentives

- Seven year income tax holiday;
- Duty free importation of RE machinery, equipment and materials within the first 10 years;
- 1.5% realty tax cap on original cost of equipment and facilities to produce RE;
- Net operating loss carryover (to be carried for the next 7 consecutive years);
- 10% corporate tax rate (instead of the regular 35%);
- Tax exemption on carbon credits; and
- Tax credit on domestic capital equipment and services.

Incentives for Feedstock Producer

- Duty free importation and VAT exemption on all types of agricultural inputs, equipment, and machinery.

Incentives for RE Commercialization

- Tax and duty-free importation of components, parts and materials;
- Tax credit on domestic capital components, parts and materials;
- Income tax holiday for 7 years;
- VAT zero-rated for all RE equipment transactions; and
- 50% tax rebate for purchase of RE equipment.

Consumption Incentives

- Zero percent VAT on sale of fuel generated from RE;
- Green energy option to allow end-users the option to use RE as their source of energy; and
- Net-metering for RE to allow end-users generating own power to sell it to the grid.

The law also mandates that communities hosting RE projects will get 80% of the government's share from these projects provided their monthly electricity consumption does not exceed 100 kilowatt per hour.

Last July, the DOE also announced that it will put up a P2B renewable trust fund to help develop the RE sector and promote the use of RE in the country. The funds will come from various government-owned and controlled corporations and from a portion of the government's royalties from several service contracts. Specifically, 1.5% of the remittances from PAGCOR and PCSO will go to the fund. Likewise, a portion of the government's earnings from PNOC, royalties of DOE from various service contracts, and payments for violations of the Clean Air Act will also go to the fund.

Another provision of the IRR is the creation of the National Renewable Energy Board (NREB) which will serve as the recommending body on renewable energy policies and action plans for the implementation of the DOE and is responsible for the implementation of RE trust fund. The board shall be composed of representatives from various sectors: the DOE, DTI, DOF, DENR, PNOC, Transco, NPC, PEMC, RE developers, GIFs, NGOs, private distribution utilities, and electricity suppliers.

One of the significant tasks of the NREB is to help develop the feed-in tariff system, an incentive most awaited by companies engaged in renewable energy projects. The feed-in system is an incentive mechanism that guaranteed fixed rate for at least 12 years for electricity produced from emerging RE resources (wind, solar, ocean, run-of-river hydro and biomass).

Box 3. Bangui Bay Wind Project: Green and Profiting

In 2005, fifteen wind turbines, each 70 meters tall, each with three 41 meter blades rise along a nine-kilometer windswept beach in Bangui, Ilocos Norte. Run by the Northwind Power Development Corporation, the Northwind Bangui Bay Wind Project, is the first of its kind in the Philippines and the Southeast Asia. With the addition of 5 wind turbines in 2008, the project supplies around 33 MW of wind energy to Ilocos Norte Electric Cooperative (INEC). This is equivalent to around 40% of INEC's power requirements.

The Bangui Bay Project was made viable with the loan from the Danish government. The Danish government, thru the Danish International Development Agency (DIDA), extended the firm a \$29.5M zero-interest loan. The balance of the \$48M initial investment was financed thru debt and equity by Northwind's shareholders.

With the appreciation of peso and attractive tariffs, Northwind Power has already turned a profit in the last three years.

	2006	2007	2008
Total Assets	1,977.0	1,948.9	2,499.4
Total Liabilities	1,372.8	1,091.7	1,631.5
Stockholders' Equity	604.2	857.2	867.8
Net Fees	268.3	375.9	288.3
Net Income	52.3	288.4	10.6
ROE	8.7%	33.6%	1.2%
ROA	2.6%	14.8%	0.4%

Source: Securities and Exchange Commission
*Amounts in million PhP

Aside from the money it generates from selling wind power, Northwind also earns cash from the greenhouse gases it offsets. The project is one of the 17 projects registered with the CDM Executive Board – an international body that issues certificates called the certified emission reductions or CERs that are used in carbon trading. A CER is issued for every ton of carbon dioxide equivalent.

As of 2008, the Bangui wind project emission offset reach up to 57,000 tons of carbon dioxide equivalent. All of the firms CERs in the first three years of operation were sold to World Bank, the trustee of the Prototype Carbon Fund which is comprised of 17 companies and 6 governments, under the emission reduction purchase agreement it inked in 2004. Under the agreement, World Bank agreed to buy each ton of carbon dioxide equivalent for \$4.25 for 10 years.

Renewable Energy Projects in the Philippines

Geothermal Power

Geothermal energy comprised 23% of the Philippines energy mix. The number of geothermal plants in the country has grown substantially from 4 plants in 1979 to 29 in 2008. By 2014, 17 new plants are expected to be on-stream.

There are seven companies in the Philippines with existing stakes in the geothermal sector. Energy Development Corporation (EDC) is the biggest geothermal producer in the country accounting for 62% of the total installed capacity. Other industry players include Geysir Green Energy (Biliran Geothermal Inc.), Chevron Geothermal Philippines Holdings, Inc., Aboitiz Power Renewable Inc., Ayala Corp., First Gen Corp. and the National Power Corporation.

Apart from providing substantial energy for the country, geothermal resources at the same time, also help the country save large foreign exchange thru displacement of a large fraction of imported oil. For the next ten years, geothermal energy is expected to displace an average of 25MMBFOE of imported fuel oil, equivalent to foreign exchange savings of about \$588.4M (based on the average crude price of \$25 per barrel).

Hydro Power

The Philippines has vast hydropower potential given its archipelagic location. Hydropower energy contributes 6.15% to the country's power mix.

Hydro power plants are classified according to their capabilities as follows: (1) micro hydro - 1 to 100 kW, (2) mini-hydro – 101 kW -10 MW, and (3) large hydro – more than 10 MW. The Philippines has a total untapped hydro power potential of more than 13,000 MW. Out of which, 85% are classified as large and small hydros, 14% are mini-hydros and 1% are micro-hydros.

As of 2008, DOE monitored 21 existing mini-hydro power plants as well as the construction of an additional 5 mini-hydro power plants. It also issued five mini-hydro operating contracts with capacity of 17.5 MW.

Ocean, Solar and Wind (OSW) and Biomass

Biomass accounts for 13.76% of the Philippines energy mix while ocean, solar and wind (OSW) contributes a paltry 0.01%. As of 2008, the aggregate existing capacity from these sources totaled to 106 MW out of at least 246,000 MW of energy potential.

Nonetheless, the Philippines is one of the largest wind energy producer in the Southeast Asia with the operation of the two 5MW wind turbines located in Bangui, Ilocos Norte and the additional 8 MW commissioned in August 2008.

Box 4. Hedcor: The Philippines Leading Hydropower Developer

Aboitiz Group's power generation unit, Hedcor, is the country's largest developer of run-of-river hydro power in the Philippines. It operates 15 hydro power plants located in Benguet and Davao, with total installed capacity of 38MW of clean and renewable energy.

The company's installed capacity is expected to triple in the next two years with the expected completion of its largest hydro power project, the 42.5MW Sibulan hydro electric power facilities and the 27.5MW Tamugan hydro power plant in Davao.

In the next few years, Hedcor plans to build its biggest run-of-river hydro power facilities in Benguet, which is composed of four small hydro power plants. The plants will have a combined capacity of 120MW.

Financing Renewables in the Philippines

There are several barriers to investment in the renewable energy sector. Most of the renewable energy projects in the country are in the early stage of development and there is lack of available financing to support such projects. The DOE projected that the Philippines will need \$8.5B worth of investments for RE in the next 10 years.

The renewable energy sector in the Philippines also has limited number of experienced service and technology providers as well as project developers. There is also poor information dissemination on laws and regulations governing the renewable energy sector among the sector's stakeholders.

Aside from regular financing from financial institutions, there are also a number of institutions that provide financing assistance specifically for renewable energy projects. Here are some of them:

Funded by the Global Environment Facility (GEF) thru grants to CBRED Project (Capacity Building to Remove Barriers on Renewable Energy Development in the Philippines) being implemented by the United Nations Development Program (UNDP), the DOE and UNDP launched in 2007 two financing programs to promote and accelerate the development of renewable sector in the country.

There is the Project Preparation Fund (PPF), a partial loan fund intended to assist project developers in paying up to 50% of the cost of eligible project preparation activities (i.e. market assessment, technical data gathering, site assessment, engineering design and feasibility study). Landbank serves as the program and fund manager for PPF.

In addition, the Local Guarantee Fund (LGF) will be used as a partial loan guarantee mechanism for RE projects. LGF will be available to RE project developers, including retail funders of RE systems, whose loans may require a high level of securitization or are inadequately capitalized and could not meet the collateral

requirements of financial institutions. The LGU Guarantee Corporation, and Banco de Oro – Universal Bank will act as the Program Manager and Escrow Agent, respectively, for the LGF.

The International Finance Corp, the World Bank's private-sector arm, has also chosen the Philippines to be the 9th country in the world to implement the Sustainable Energy Finance Program (SEFP). The program aims to build the capabilities of local financial institutions to increase commercial financing of RE projects. Presently, IFC has partnered with BPI and Metrobank in the implementation of the program.

Launched in 2008, the SEPF offers the following support to local FIs:

- Advice to FIs and borrowers on the business case for RE and energy efficiency;
- IFC credit lines and partial guarantees (up to 50% of loan for local banks and leasing companies);
- Networking between local banks and major players in the energy business; and
- Broad scope of technical assistance for all program participants (i.e. energy audits, review of feasibility studies, training in structuring and marketing financing products).



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