
ENERGY INVESTMENT
2013

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POWER SECTOR

Power Sector Situationer

Currently, the country has a total installed capacity of 17,025 MW and a dependable capacity of 15,066 MW. As indicated in Table1, the power plants in the country are supplied by a blend of fuel sources with coal providing 33%, hydro 21%, oil based 18%, natural gas 17%, geothermal 11%, biomass, 0.7%, wind 0.19% and solar 0.01%.

The aggregate installed capacity from natural gas and renewable energy resources is 8,384MW or equivalent to 49.25%.

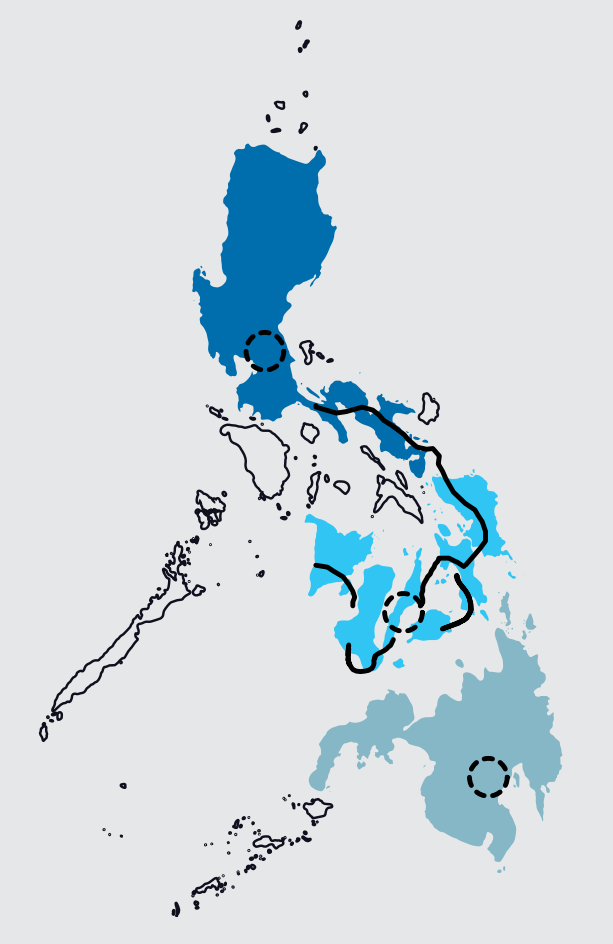
TABLE 1. 2013 CAPACITIES, MW

Fuel Type	Philippines			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
Coal	5,568	5,206	32.71	34.55
Oil Based	3,074	2,561	18.05	17.00
Natural Gas	2,862	2,760	16.81	18.32
Geothermal	1,848	1,462	10.85	9.70
Hydro	3,521	2,983	20.68	19.80
Wind	33	17	0.19	0.12
Solar	1	0	0.01	0.00
Biomass	119	76	0.70	0.51
TOTAL	**17,025**	**15,066**		

Source: DOE- EPIMB
Note: Based on existing power plants including embedded generators

The Luzon and Visayas transmission grids are interconnected by submarine cables with a capacity of 400 MW. Similarly, the islands in the Visayas grid are also interconnected with various capacities shown in Figure 1. The feasibility study for the interconnection of the Visayas and Mindanao grid has already been concluded in March 2013 and project completion is targeted on 2018.

FIGURE 1



Note: Transparent islands in the above diagram are not covered by NGCP's network.

Interconnection Line Capacity

- Leyte - Luzon (440 MW)
- Leyte - Cebu (400 MW)
- Leyte - Bohol (100 MW)
- Cebu - Negros (200 MW)
- Negros - Panay (100 MW)

The wholesale electricity spot market (WESM) is already in place in Luzon and Visayas. In Mindanao, an Interim Mindanao Electricity Market (IMEM) has recently been launched in Davao City and commercial operation commenced on November 26, 2013.

Power Supply and Demand Outlook

The Luzon grid takes the bulk of the installed capacity of the country at 12,528 MW or 75% of the total installed capacity in the country. The power plants in Luzon are fueled by 36% coal, 23% natural gas from the Malampaya field, 20% hydro, 14% oil based, 7% from geothermal energy, 0.31% from biomass and 0.26% from wind energy. The Visayas grid is supplied with 37% from geothermal energy sources while the Mindanao grid is 51% reliant on hydro sources.

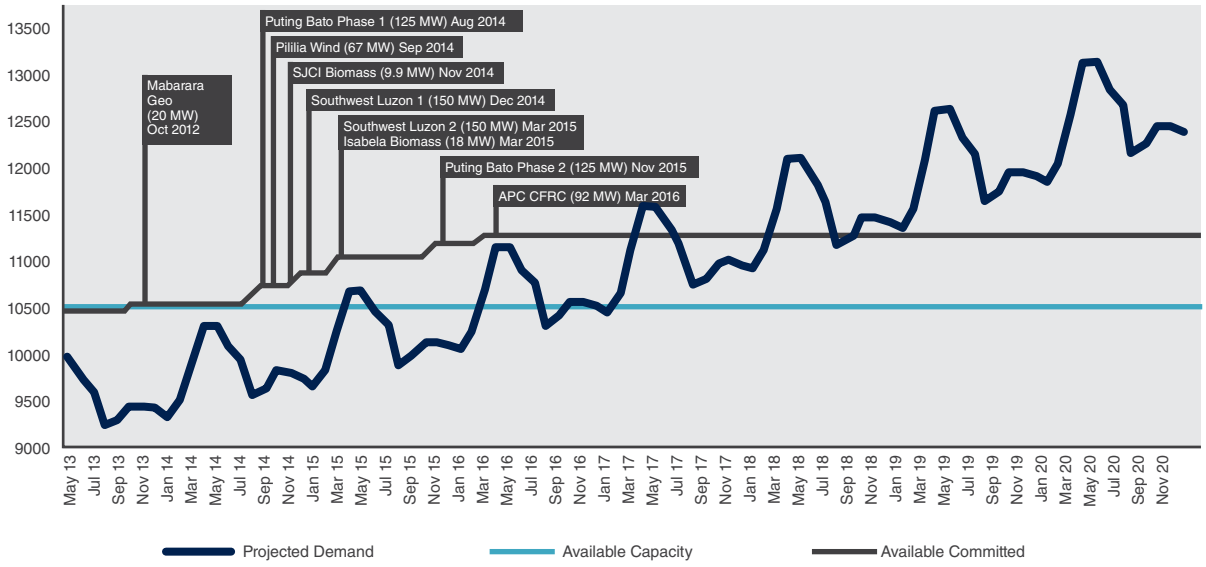
TABLE 2. 2013 INSTALLED CAPACITIES, MW

Fuel Type	Luzon		Visayas		Mindanao		Philippines	
	MW	% Share	MW	% Share	MW	% Share	MW	% Share
Coal	4,531	36.16	806	32.91	232	11.32	5,568	32.71
Oil Based	1,778	14.19	670	27.39	625	30.50	3,074	18.05
Natural Gas	2,861	22.84	1	0.04			2,862	16.81
Geothermal	824	6.58	915	37.39	108	5.29	1,848	10.85
Hydro	2,462	19.66	11	0.47	1,047	51.09	3,521	20.68
Wind	33	0.26					33	0.19
Biomass	38	0.31	44	1.81	36	1.75	119	0.70
Solar					1	0.05	1	0.01
TOTAL	**12,528**		**2,448**		**2,049**		**17,025**	

Luzon

Based on the 2013-2020 forecast, Figure 2 indicates that the Luzon grid will be needing 184 MW by 2015 and an additional 635 MW will be required in 2016 based on the existing capacities. However, with the committed capacity of 1,367.40MW in Luzon, 339 MW will be needed in 2017 and an additional 833 MW will be expected in 2018:

FIGURE 2. LUZON SUPPLY-DEMAND OUTLOOK 2013-2020



CRITICAL PERIODS

On Available Capacity
- 2015 Peak: Projected Deficit of 184 MW
- 2016 Peak: Projected Deficit of 635 MW

On Available Capacity + Committed
- 2017 Peak: Projected Deficit of 339 MW
- 2018 Peak: Projected Deficit of 833 MW

Notes:

a. Demand curve as plotted includes total of peak demand and required Reserve Margin (RM) i.e. 4% regulating reserve and contingency and dispatchable reserve requirement.
b. 4.2% peak demand growth rate resulted from observed 0.6 elasticity ratio of demand for electric power with national economic growth applied to 7 percent GDP growth rate (GR) target for 2013-2015.
c. 4.8% peak demand growth rate resulted from observed 0.6 elasticity ratio of demand for electric power with national economic growth applied to 8 percent GDP growth rate (GR) target for 2016-2020.
d. Assumed 6.6 percent average forced outage of the total dependable capacity.

Aside from the committed power projects, there are 10,714.50 MW indicative power projects initiated by the private sector with details provided in Table 3.

TABLE 3. PRIVATE SECTOR INITIATED POWER PROJECTS IN LUZON (AS OF OCTOBER 2013)

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
COMMITTED			**1,367.40**	
135 MW Puting Bato Coal-Fired Power Plant Phase I	South Luzon Thermal Energy Corp. (SLTEC)	Brgy. Puting Bato West, Calaca, Batangas	135	August 2014
135 MW Puting Bato Coal-Fired Power Plant Phase II	South Luzon Thermal Energy Corp. (SLTEC)	Brgy. Puting Bato West, Calaca, Batangas	135	November 2015
2 x 150 MW SLPGC Coal-Fired Power Plant Phase 1	Southwest Luzon Power Generation Corporation	Brgy. San Rafael, Calaca, Batangas	300	Unit 1 - Nov. 2014 Unit II - Feb 2015
Anda Power Corporation's 82 MW Circulating Fluidized Bed Coal-Fired Power Plant	Anda Power Corporation	Brgy. Bundagul, Mabalacat, Pampanga	82	March 2016
Pagbilao 600 MW Combined Cycle Gas-Fired Power Plant (Proposed 3 x 200 MW CCGT Power Plant)	Energy World Corporation	Brgy. Ibabang Polo, Grande Island, Pagbilao, Quezon	600	Unit I - 2014 Unit II - 2015 Unit III - 2016
Maibarara Geothermal Power Project	Maibarara Geothermal, Inc.	Sitio Capuz, Brgy. San Rafael, Sto. Tomas, Batangas	20	November 2013
Phase 1: Pililia Wind Power Project	Alternergy Wind One Corporation	Brgy. Halayhayin, Pililla, Rizal	67.5	September 2014
9.9 MWe (net) SJCIP Power Rice Husk-Fired Biomass Power Plant Project	San Jose City I Power Corporation	Brgy. Tulat, San Jose, Nueva Ecija	9.9	March 2015 (Subject to FIT)
20 MW IBEC Biomass Power	Isabela Biomass Energy Corporation	Isabela	18.0	March 2015 (Subject to FIT)
INDICATIVE			**10,342.50**	
2 x 20 MW FDC Camarines CFB Coal Power Plant	FDC Utilities, Inc.	Camarines Sur	40	March 2016
2 x 300 MW Coal-Fired Power Plant	Redondo Peninsula Energy, Inc.	Sitio Naglatore, Cawag, Subic Bay Freeport Zone	600	Unit I - Oct. 2016 Unit II - Dec. 2016
2 x 600 MW Mariveles Expansion Project	GNPower Mariveles Coal Plant Ltd. Co.	Mariveles, Bataan	1,200	2018
2 x 150 MW SLPGC Coal-Fired Power Plant Phase II	Southwest Luzon Power Generation Corporation	Brgy. San Rafael, Calaca, Batangas	300	Unit 1 - 2016 Unit II - 2016
2 x 300 MW Masinloc Expansion	AES Masinloc Power Partners Co., Inc.	Zambales	600	Unit 3 (300 MW) - Oct. 2017 Unit 4 (300 MW) - Oct. 2017
300 MW Limay Power Plant Project Phase I (2 x 150 MW)	SMC Consolidated Power Corporation	Brgy. Lamao, Limay, Bataan	300	Unit I (150 MW) - Feb. 2016 Unit II (150 MW) - July 2016
Quezon Power Expansion Project	Quezon Power Phils.	Mauban, Quezon	500	March 2018
300 MW Limay Power Plant Project Phase II (2 x 150 MW)	SMC Consolidated Power Corporation	Brgy. Lamao, Limay, Bataan	300	Unit I (150 MW) - Feb. 2016 Unit II (150 MW) - July 2016
300 MW Limay Power Plant Project Phase III (1 x 300 MW)	SMC Consolidated Power Corporation	Brgy. Lamao, Limay, Bataan	300	2019 / 2020
Total Coal			**4,140**	

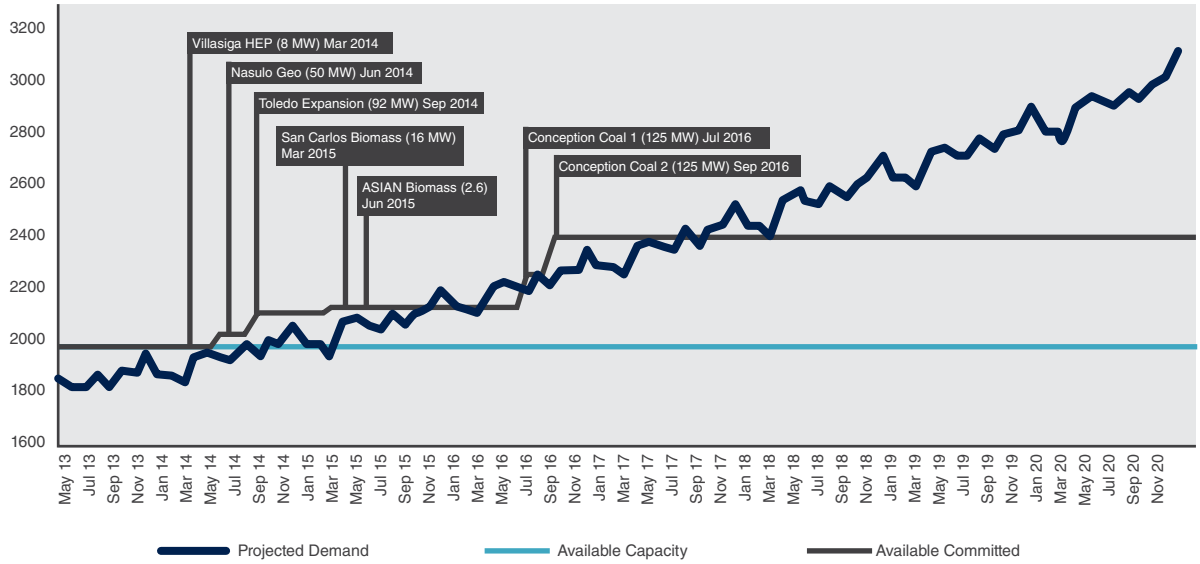
Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
Aero Derivative Combined Cycle Power Plant	Calamba Aero Power Corporation	Calamba, Laguna	150	TBA
Total Diesel			**150**	
Pagbilao 300 MW Combined Cycle Gas-Fired Power Plant	Energy World Corporation	Brgy. Ibabang Polo, Grande Island, Pagbilao, Quezon	300	June 2014
300 MW Batangas Mid-Merit Plant Project	First Gen Corporation	Batangas	300	September 2014
San Gabriel Power Plant	First Gas Power Corp.	San Gabriel, Batangas	550	September 2015
LNG-Fired Combined Cycle Power Plant	Meralco PowerGen Corporation	Atimonan, Quezon	1,750	2018
2 x 1,200 MW Combined Cycle Gas Turbine Power Plant Project	Atlantic, Gulf and Pacific Company of Manila, Inc.	Limay, Bataan (PNOC-AFC Industrial Estate)	2,400	Unit I - Mar 2017 Unit II - Mar 2018
415 MW San Isidro Combined cycle Gas Turbine Plant Project	Trans Asia Oil and Energy Development Corporation (TAOil)	Pilipinas Shell Petroleum Co.'s Tabangao Refinery, Brgy. San Isidro and Tabangao-Ambulong, Batangas City	415	September 2017
Total Natural Gas			**5,415**	
Tanawon Geothermal Project	Energy Development Corporation	Guinlajon, Sorsogon	40	December 2018
Rangas Geothermal Project	Energy Development Corporation	Bacon District, Sorsogon	40	June 2019
Kayabon Geothermal Project	Energy Development Corporation	Manito, Albay	40	December 2019
Total Geothermal			**120**	
Dupinga Hydroelectric Power Project	Constellation Energy Corporation	Gabaldon, Nueva Ecija	3.0	October 2015
Ibulao Hydroelectric Power Project	Hydrocore, Inc.	Lagawe, Ifugao	4.5	May 2015
Total Hydro			**7.5**	
Phase 2 : Mabitac Wind Farm Project	Alternergy Sembrano Wind Corporation	Mt. Sembrano, Mabitac, Rizal	56	January 2017
Phase 1 : Pasuquin East Wind Energy Project	Energy Logics Philippines, Inc.	Pasuquin, Ilocos Norte	48	January 2017 (Subject to FIT)
Burgos Wind Power Project	EDC Burgos Wind Power Corporation	Nagsurot-Saoit, Burgos, Ilocos Norte	150	October 2014 (Subject to FIT)
Cavinti Wind Farm Project	Alternergy Cavinti Wind Corporation	Cavinti, Laguna	50	January 2017
81 MW Caparispisan and Baloi Wind Energy Project	Northern Luzon UPC Asia Corporation	Brgys. Caparispisan and Baloi, Pagudpud, Ilocos Norte	81	September 2014
Baloi Wind Power Project	Northern Luzon UPC Asia Corporation	Brgy. Balaoi, Pagudpud, Ilocos Norte	45	August 2015
Total Wind			**430**	
Curimao Solar Photovoltaic Power Project	Mirae Asia Energy Corporation	Curimao, Ilocos Norte	20	August 2014 (Subject to FIT)
Macabud Solar Photovoltaic Power Project	ATN Philippines Solar Energy Group Inc.	Brgy. Macabud, Rodriguez, Rizal	30	February 2016 (Subject to FIT)
Total Solar			**50**	

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
20 MW Waste-to-Energy Project using Thermal Gasifier Conversion	CJ Global Green Energy Philippine Corp.	Camarines Sur	18	June 2015
12 MW Rice Husk-Fired Biomass Power Plant	Green Innovations for Tomorrow Corporation	Bacal 2, Talavera, Nueva Ecija	12	October 2015
Total Biomass			**30**	
Total (Committed and Indicative)			**11,709.90**	

Visayas

With the current existing capacity In the Visayas Region, Figure 3 shows that 92 MW will be required by 2014 and 221 MW in 2015. On the otherhand, considering the capacities committed to be generated by the private sector, 62 MW will be essential in 2015, 100 MW in 2016 and 121 MW in 2017.

FIGURE 3. VISAYAS SUPPLY-DEMAND OUTLOOK 2013-2020



CRITICAL PERIODS

On Available Capacity
- 2014 Peak: Projected Deficit of 92 MW
- 2015 Peak: Projected Deficit of 221 MW

On Available Capacity + Committed
- 2015 Peak: Projected Deficit of 62 MW
- May 2016 Peak: Projected Deficit of 100 MW
- 2017 Peak: Projected Deficit of 121 MW

Notes:

a. Demand curve as plotted includes total of peak demand and required Reserve Margin (RM) i.e. 4% regulating reserve and contingency and dispatchable reserve requirement.
b. 7% peak demand growth rate resulted from observed 1 elasticity ratio of demand for electric power with national economic growth applied to 7 percent GDP growth rate (GR) target for 2013-2015.
c. 8% peak demand growth rate resulted from observed 1 elasticity ratio of demand for electric power with national economic growth applied to 8 percent GDP growth rate (GR) target for 2016-2020.
d. Assumed 7 percent average forced outage of the total dependable capacity.

Table 4 summarizes the 429.6 MW committed and the 807 MW indicative power projects in the Visayas area.

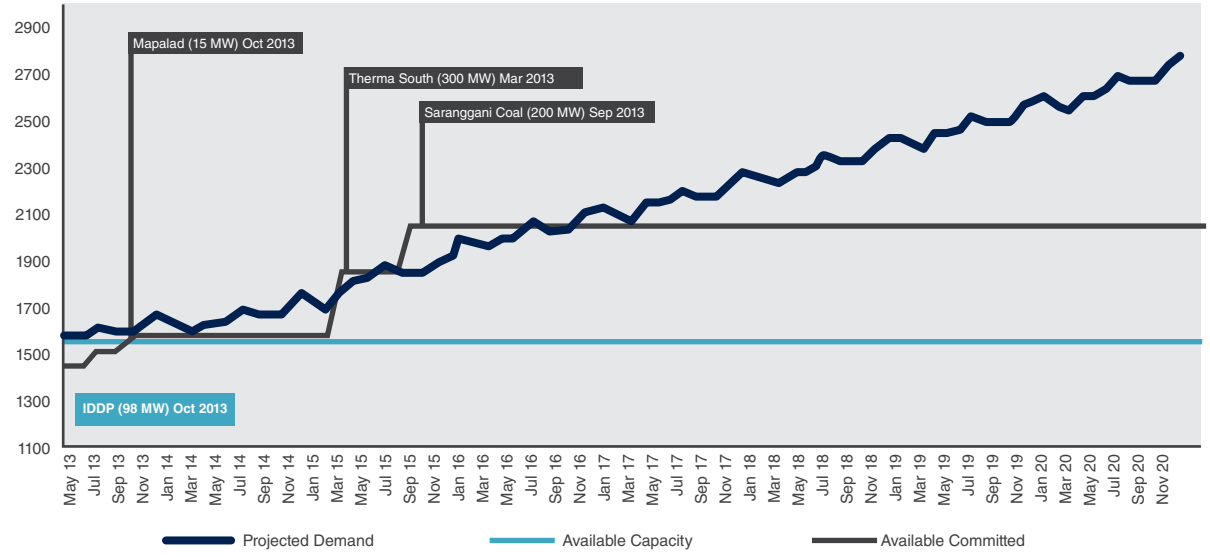
TABLE 4. PRIVATE SECTOR INITIATED POWER PROJECTS IN VISAYAS (AS OF OCTOBER 2013)

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
COMMITTED			**429.60**	
2 x 135 MW Concepcion Coal-Fired Power Plant	Palm Thermal Consolidated Holdings Corp.	Brgy. Nipa, Concepcion, Iloilo	270	Unit 1 - 3rd Qtr 2015 Unit II - Sept 2016
TPC Coal-Fired Power Plant Expansion Project (1 x 82 MW Coal-Fired Power Plant)	Toledo Power Company	Toledo City, Cebu	82	September 2014
Nasulo Geothermal Power Project	Energy Development Corporation	Nasuji, Valencia, Negros Oriental	50	June 2014
Villasiga HEP	Sunwest Water & Electric Co., Inc.	Brgy. Igsoro, Bugasong, Antique	8	March 2014
Consolacion Landfill Methane Recovery and Electricity Generation	Asian Energy System Corporation	Cebu	3.6	June 2015
18 MW San Carlos Biomass Project	San Carlos BioPower Inc.	San Carlos City, Negros Occidental	16	March 2015
INDICATIVE			**807**	
1 x 20 MW FDC Danao CFB Coal Power Plant	FDC Utilities, Inc.	Danao City, Cebu	20	2016
PEDC Expansion Project (Coal-Fired Power Plant) (1 x 150 MW CFB Coal Fired Power Plant)	Panay Energy Development Corporation	Brgy. Ingore, La Paz, Iloilo	150	2015
300 MW Therma Visayas Energy Project	Therma Visayas Inc.	Brgy. Bato, Toledo City, Cebu	300	March 2017
Total Coal			**470**	
Dauin Geothermal Power Project	Energy Development Corporation	Dauin, Negros Oriental	40	December 2018
49 MW Biliran Geothermal Power Plant Project	Energy Development Corporation	Biliran, Leyte	49	December 2015
Total Geothermal			**89**	
Leyte Solar Photovoltaic Power Project	Phil. Solar Farm - Leyte, Inc.	Ormoc City, Leyte	30	January 2015
Total Solar			**30**	
Timbaban Hydroelectric Power Project	Oriental Energy and Power Generation Corp.	Madalag, Aklan	18	August 2017
Igbulo (Bais) Hydroelectric Power Project	Century Peak Energy Corporation	Igbaras, Iloilo	6	January 2015
Total Hydro			**24**	
Nabas Wind Farm Project	Petrogreen Energy Corporation	Brgy. Pawa, Nabas, Aklan	50	December 2014
54 MW San Lorenzo Wind Power Project (8 MW & 46 MW)	Trans-Asia Renewable Energy Corporation	San Lorenzo, Guimaras Island	54	August 2014
Pulupandan Wind Power Project	First Maxpower International Corporation	Pulupandan, Negros Occidental	50	November 2015
Total Wind			**154**	
40 MW Battery Storage Project	AES Philippines Power Partners Co., LTD.	Kabankalan, Negros Occidental	40	March 2015
Total Battery Storage			**40**	
Total (Committed and Indicative)			**1,236.60**	

Mindanao

As indicated in Figure 4, with the available capacity in the Mindanao grid, 119 MW needs to be provided within the year, 191 MW in 2014 and 377 MW. However, with the 515 MW committed capacity based on the projects proposed by the private sector, Mindanao will require 70 MW in 2016 and 215 MW in 2017.

FIGURE 4. MINDANAO SUPPLY-DEMAND OUTLOOK 2013-2020



CRITICAL PERIODS

On Available Capacity
- 2013 Peak: Projected Deficit of 119 MW
- 2014 Peak: Projected Deficit of 191 MW
- 2015 Peak: Projected Deficit of 377 MW

On Available Capacity + Committed
- 2016 Peak: Projected Deficit of 70 MW
- 2017 Peak: Projected Deficit of 215 MW

Notes:

a. Demand curve as plotted includes total of peak demand and required Reserve Margin (RM) i.e. 4% regulating reserve and contingency and dispatchable reserve requirement.
b. 5.6% peak demand growth rate resulted from observed 0.8 elasticity ratio of demand for electric power with national economic growth applied to 7 percent GDP growth rate (GR) target for 2013-2015.
c. 12.8% peak demand growth rate resulted from observed 1.6 elasticity ratio of demand for electric power with national economic growth applied to 8 percent GDP growth rate (GR) target for 2016-2020.
d. 8% peak demand growth rate resulted from observed 1 elasticity ratio of demand for electric power with national economic growth applied to 8 percent GDP growth rate (GR) target for 2016-2020.
e. Assumed 3.41 percent average forced outage of the total dependable capacity.

The committed and indicative power projects in Mindanao are listed in Table 5.

TABLE 4. PRIVATE SECTOR INITIATED POWER PROJECTS IN MINDANAO (AS OF OCTOBER 2013)

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
COMMITTED			**515.0**	
2 x 150 MW Coal-Fired Therma South Energy Project	Therma South Inc.	Brgy. Binugao, Toril, Davao City and Brgy. Inawayan, Sta. Cruz, Davao del Sur	300	November 2014
2 x 100 MW Southern Mindanao Coal-Fired Power Station	Saragani Energy Corporation	Brgy. Kamanga, Maasim, Sarangani	200	February 2015
15 MW Diesel Power Plant	Mapalad Energy Generating Corporation	Mapalad, Dalipuga, Iligan City	15	December 2013

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
INDICATIVE			**2,564.60**	
ZAM 100 MW CFB Coal Fired Power Station	San Ramon Power, Inc.	Sitio San Ramon, Brgy. Talisayan, Zamboanga City	100	December 2015
Davao del Norte 20 MW CFB Biomass – Coal Fired Thermal Power Plant	FDC Utilities, Inc.	Maco, Davao del Norte	20	March 2015
300 MW SMC Davao Power Plant Project Phase I	San Miguel Consolidated Power Corporation	Brgy. Culaman, Malita, Davao del Sur	300	150 MW - Oct. 2015 150 MW - March 2016
Sibuguey Power Plant Project	Philippine National Oil Company	Sibugay, Zamboanga	100	September 2016
3 x 135 MW FDC – Misamis CFB Coal-Fired Power Plant Project	FDC Utilities, Inc.	Phividec Industrial Estate, Villanueva, Misamis Oriental	405	September 2016
300 MW SMC Davao Power Plant Project Phase II	San Miguel Consolidated Power Corporation	Brgy. Culaman, Malita, Davao del Sur	300	December 2018
600 MW SMC Davao Power Plant Project Phase III	San Miguel Consolidated Power Corporation	Brgy. Culaman, Malita, Davao del Sur	600	300 MW - Dec. 2019 300 MW - Dec. 2020
3 x 135 MW Psag Corp. Coal-fired Power Plant	GN Power	Kauswagan, Lanao del Norte	405	December 2017
2 x 55 MW Balingasag Thermal Power Plant (Circulating fluidized Bed Combustion Coal-Fired Power Plant)	Minergy Coal Corporation	Brgy. Mandangoa, Balingasag, Misamis Oriental	110	January 2017
Total Coal			**2,340**	
Mindanao 3 Geothermal	Energy Development Corporation	Kidapawan, North Cotabato	50	December 2017
Total Geothermal			**50**	
Tagoloan Hydropower	First Gen Mindanao Hydropower Corp.	Impasug-ong & Sumilao, Bukidnon	20	October 2015
Bubunawan Hydroelectric Power	First Gen Mindanao Hydropower Corp.	Baungon and Libona, Bukidnon	8	October 2015
Cabadbaran Hydroelectric Power Project	First Gen Mindanao Hydropower Corp.	Cabadbaran, Agusan del Norte	14	December 2015
Puyo Hydroelectric Power Project	First Gen Mindanao Hydropower Corp.	Jabonga, Agusan del Norte	30	July 2015
Tumalaong Hydroelectric Power Project	First Gen Mindanao Hydropower Corp.	Baungon, Bukidnon	8	October 2015
Culaman Hydroelectric Power Project	Oriental Energy and Power Generation Corporation	Manolo Fortich, Bukidnon	10	June 2018
Limbatangon Hydroelectric Power Project	Turbines Resource & Development Corp.	Cagayan de Oro City	6	January 2017
Tudaya 1 Hydroelectric Power Project	Hedcor Sibulan, Inc.	Sta. Cruz, Davao del Sur	6.6	April 2015
Tudaya 2 Hydroelectric Power Project	Hedcor Tudaya, Inc.	Sta. Cruz, Davao del Sur	7	April 2015
Total Hydro			**109.6**	
Darong Solar Photovoltaic Power Project	PhilNew Energy Inc.	Sta. Cruz, Davao del Sur	35	September 2015 (Subject toFIT)
Total Solar			**35**	
10 MW Kalilangan Bio-Energy Corporation Multi Feedstock Power Generating Facility	Kalilangan Bio-Energy Corporation	FIBECO, Anahawan, Maramag, Bukidnon	10	December 2015

Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
10 MW Don Carlos Bio-Energy Corporation Multi Feedstock Power Generating Facility	Don Carlos Bio-Energy Corporation	FIBECO, Anahawan, Maramag, Bukidnon	10	December 2015
10 MW Malaybalay Bio-Energy Corporation Multi Feedstock Power Generating Facility	Malaybalay Bio-Energy Corporation	FIBECO, Anahawan, Maramag, Bukidnon	10	December 2015
Total Biomass			**30**	
Total (Committed and Indicative)			**3,079.60**	

Ideal Location of New Power Plants

Aside from the information on the potential power projects in the pipeline, it is also important to know about the existing transmission network and substations where new power plants may connect without the need for any significant transmission reinforcement as identified by the National Grid Corporation of the Philippines (NGCP). The recommended connection points in Luzon, Visayas and Mindanao are shown in Figures 5, 6, and 7, are based on the capacity of the substation for the years 2011, 2015 and 2020, and without consideration on the following other requirements in generation location siting, particularly for the non-site specific plants : (a) fuel supply/transport; (b) topology/geology of site; (c) accessibility; (d) availability of area; (e) availability of cooling water; (f) fresh water supply; (g) security; and (h) environmental concerns.

FIGURE 5. IDEAL LOCATION OF NEW POWER PLANTS IN LUZON (SOURCE NGCP)

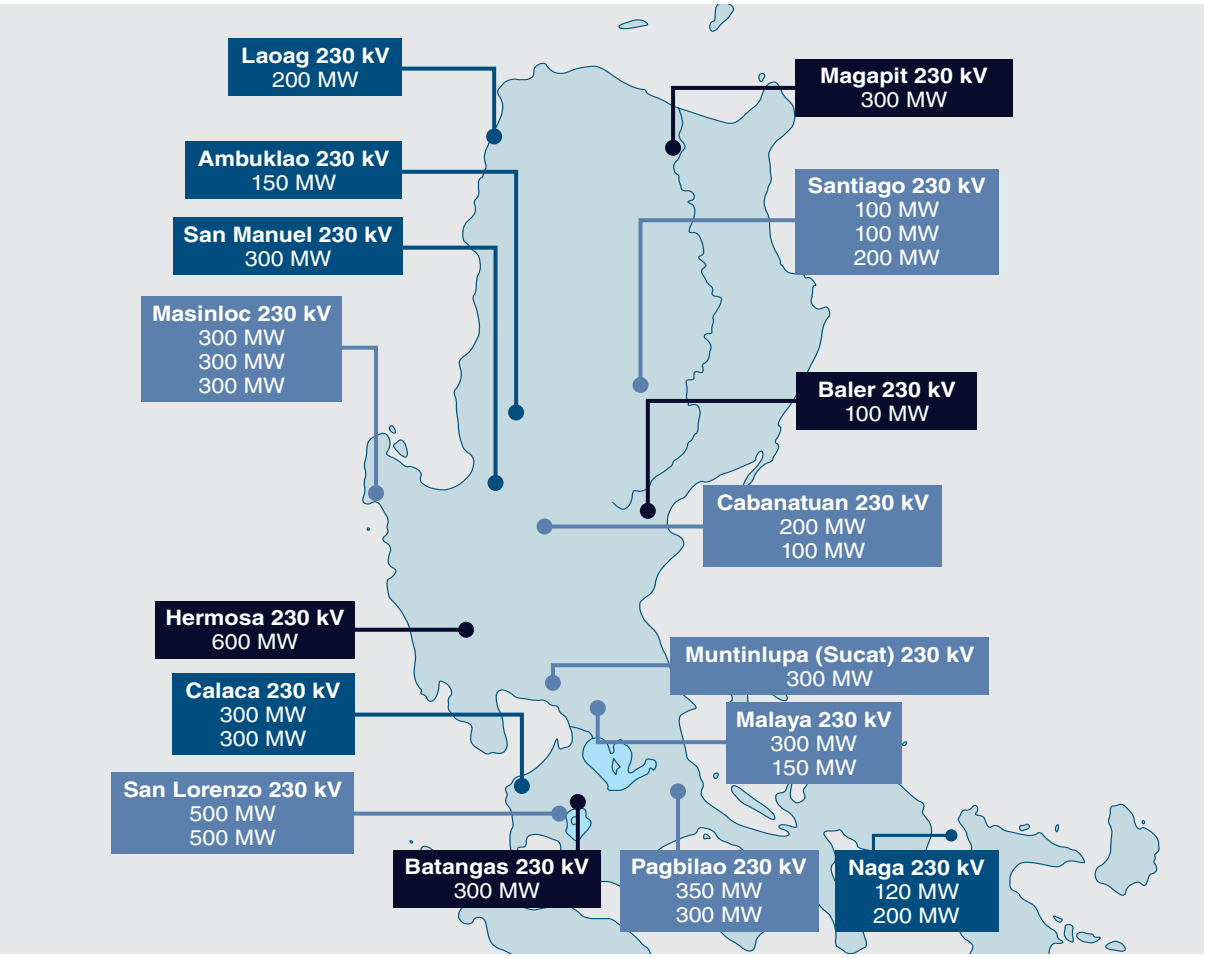


FIGURE 6. IDEAL LOCATION OF NEW POWER PLANTS IN VISAYAS (SOURCE: NGCP)

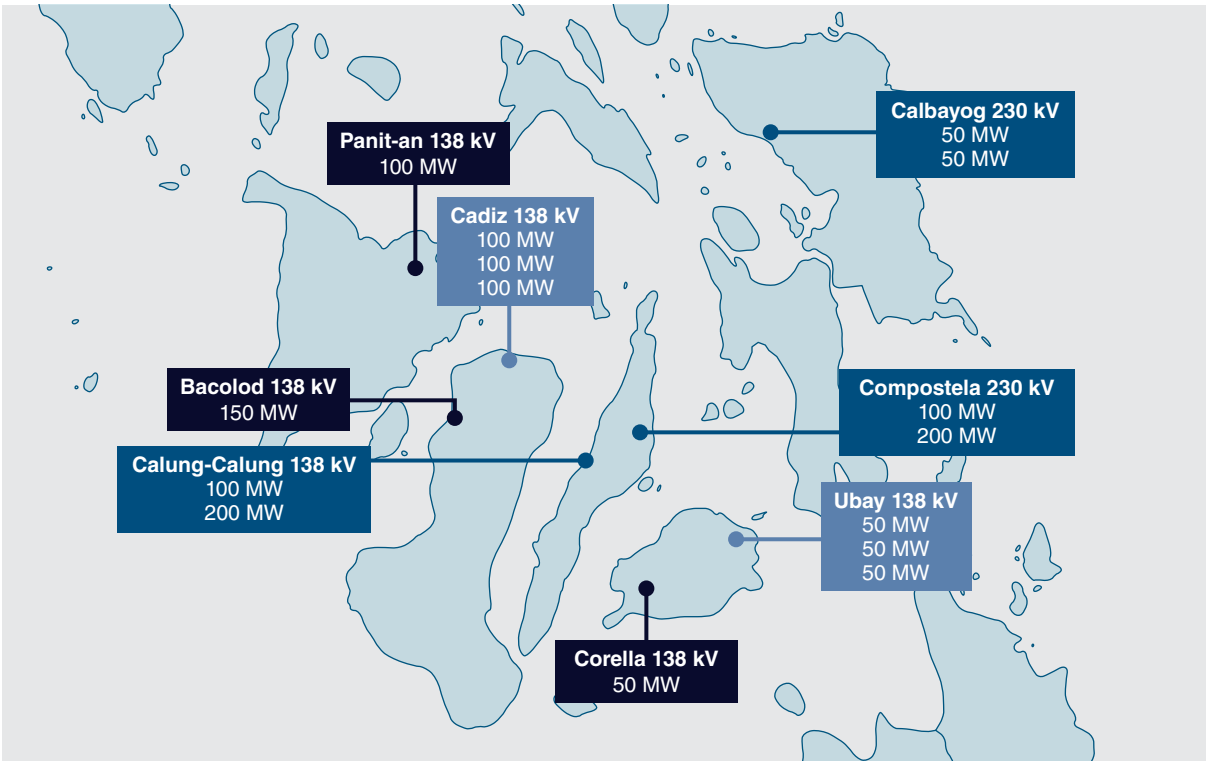
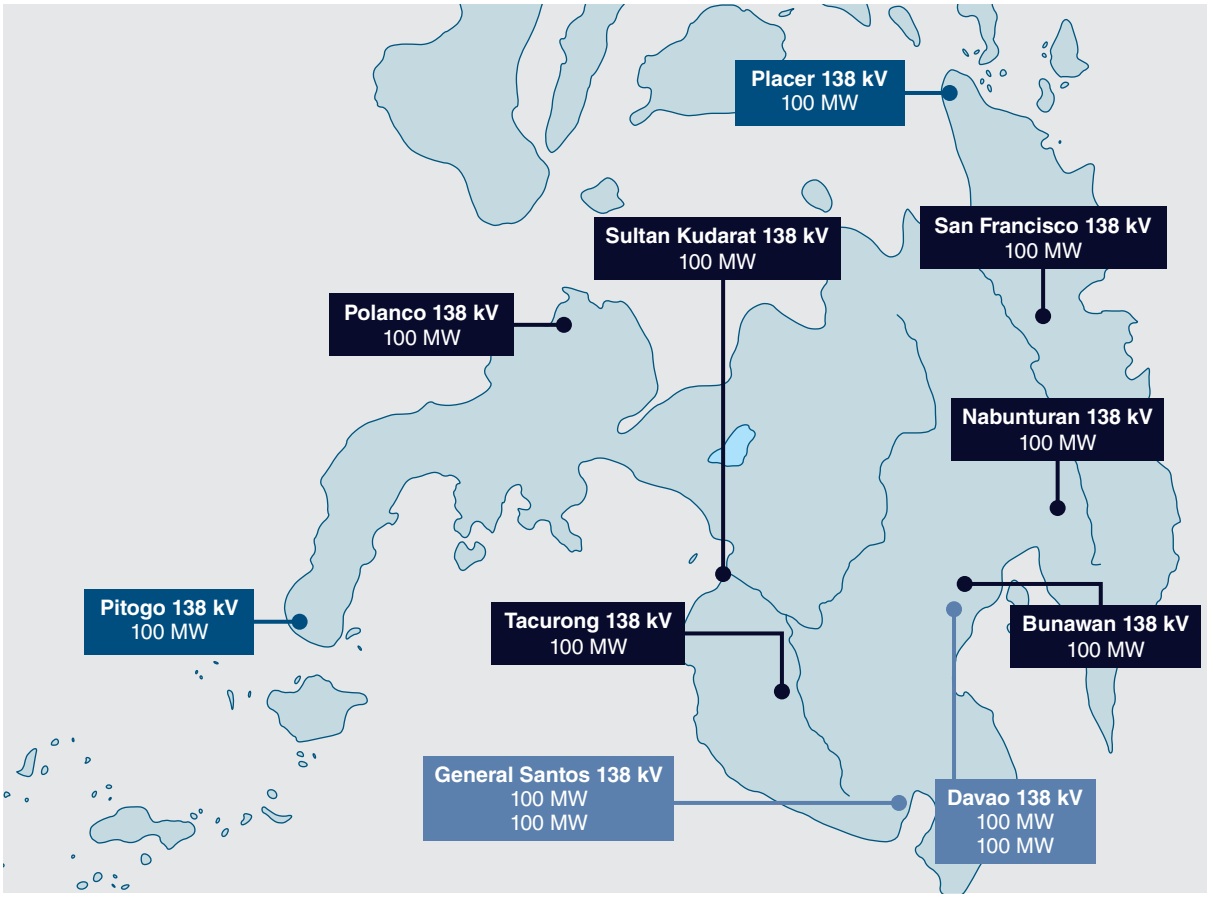


FIGURE 7. IDEAL LOCATION OF NEW POWER PLANTS IN MINDANAO (SOURCE: NGCP)

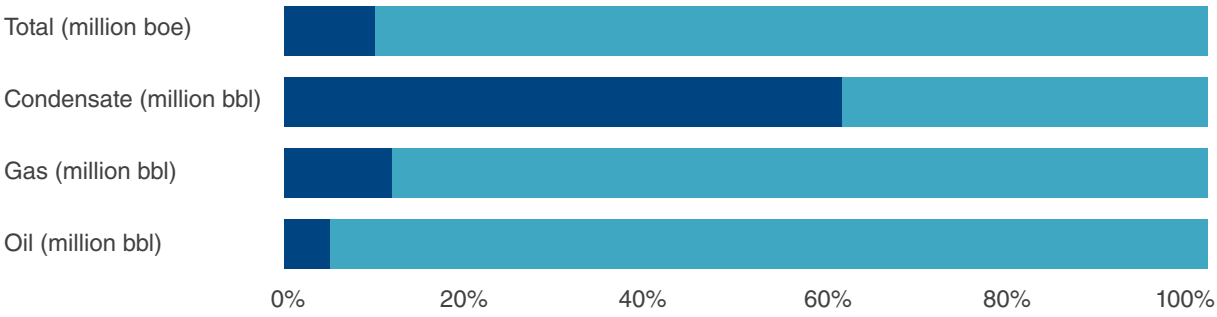


OIL AND GAS SECTOR

Industry Profile

As of 2013, the Oil and Gas Resources in the country consists of 27,987.52 billion cubic feet (billion cf) of gas and 143.12 million barrels (bbl) of condensate coming from undiscovered and discovered resources (as shown in Figure 8). The data indicate that there is a vast potential for exploration and development of oil and gas resources in the country.

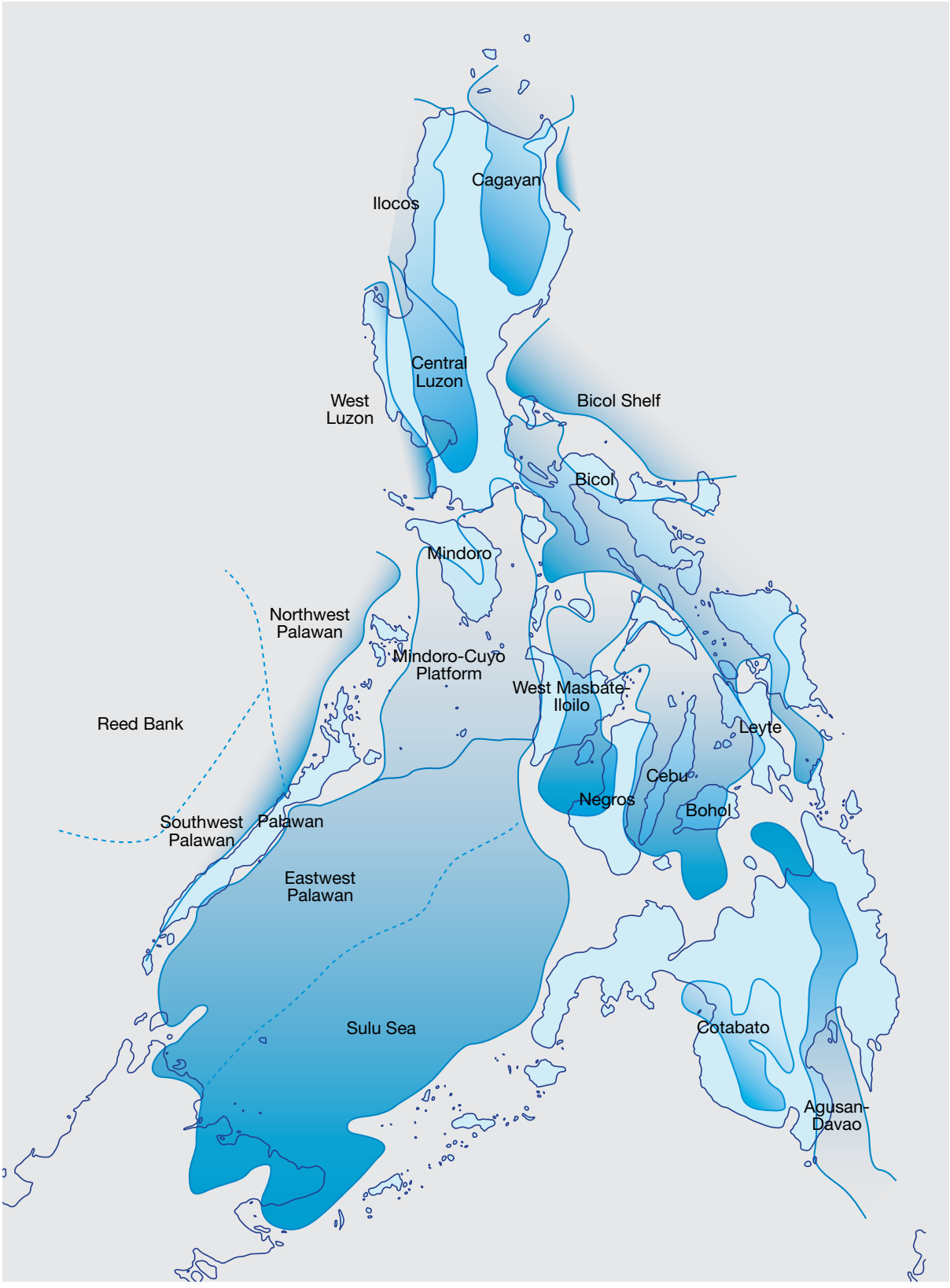
FIGURE 8. OIL AND GAS PROFILE



	Oil (million bbl)	Gas (billion cf)	Condensate (million bbl)	Total (million boe)
Discovered Sources	158.73	3,294.52	87.97	817.553
Undiscovered Sources	3,460	24,693	55.15	7,704

Further, Figure 9 shows that the country has sixteen (16) sedimentary basins with a combined potential of 4,777 MMBOE (689.8 MTOE) of oil and gas reserves . These are located in the Cagayan Valley Basin in the north down to the Agusan-Davao Basin in the south as well as the productive Northwest Palawan and the Sulu Sea Basin along the western side of the archipelago.

FIGURE 9. SEDIMENTARY BASINS OF THE PHILIPPINES



Service Contracts

Considering the huge Investment requirement in the exploration and development of indigenous oil and gas, the DOE continues to encourage the private sector's participation through the Philippine Energy Contracting Round (PECR). At present there are 26 active Petroleum Service Contracts (PSC) in the country as detailed in Table 6.

TABLE 6. ACTIVE PETROLEUM SERVICE CONTRACTS (PSCS)

No.	Service Contract No.	Operator	Location / Area (hectares)
1	6	Blade Petroleum Ltd	NW Palawan / 3,397.186
2	6A	Pitkin Petroleum Ltd	NW Palawan / 108,146.587
3	6B	The Philodrill Corp.	NW Palawan / 53,293.945
4	14A (Nido)	The Philodrill Corp.	NW Palawan / 70,887.52
5	14B (Matinloc)	The Philodrill Corp	NW Palawan/34,553.18
6	14C1 (Galoc)	Galoc Production Company	NW Palawan/ 16,300
7	14C2 (West Linapacan)	Pitkin Petroleum Ltd	NW Palawan/ 17,649
8	37	Philippine National Oil Co. - Exploration Corp.	Cagayan / 36,000.00
9	38	Shell Philippines Exploration B. V.	NW Palawan / 83,000
10	40	Forum Exploration Inc.	North Cebu / 458,000.00
11	44	Gas To Grid Ltd.	Central Cebu / 75,000
12	47	Philippine National Oil Co. - Exploration Corp.	Offshore Mindoro / 1,048,000
13	49	China International Mining Petroleum Co., Ltd.	South Cebu / 197,000
14	50	Frigstad Energy Ltd.	Calauit, NW Palawan / 128,000
15	51	Otto Energy Investments Ltd.	East Visayan Basin / 332,000
16	52	Frontier Oil Corp.	Piat San Jose, Cagayan / 96,000
17	53	Pitkin Petroleum Ltd.	Onshore Mindoro / 660,000
18	54	Nido Petroleum Phils. Pty. Ltd	NW Palawan (Area A / B = 87,616.15 / 314,000)
19	55	BHP Billiton Petroleum Philippines Corporation	West Palawan Ultra-Deepwater / 988,000
20	56	Mitra Energy Ltd.	Sulu Sea / 430,000
21	57	Philippine National Oil Co. - Exploration Corp./ China National Offshore Oil Corp. Int.	Calamian Block, NW Palawan / 712,000
22	58	Nido Petroleum Phils. Pty. Ltd.	West Calamian Block, NW Palawan / 1,344,000
23	59	BHP Billiton Pet. (Phil.) Corp.	West Balabac, SW Palawan/ 1,476,000
24	60	Shell Philippines Exploration B. V.	NE Palawan / 1,008,000
25	62	Palawan Sulu Sea Gas Inc.	East Palawan / 1,302,000
26	63	Philippine National Oil Co. - Exploration Corp. / Nido Petroleum Phils. Pty. Ltd.	SW Palawan / 1,056,000
27	64	Ranhill Energy Sdn. Bhd.	Sulu Sea / 1,264,940
28	69	Otto Energy Philippines Inc.	Visayan Basin / 528,000 hectares
29	70	Polyard Petroleum International Co. Ltd.	Central Luzon Basin / 684,000
30	72	Forum (GSEC 101) Ltd.	Reed Bank / 880,000

Philippine Energy Contracting Round (PECR)

The implementation of the PECR continues to draw interest from oil and gas operators. The government in partnership with private companies shows the continued drive and commitment to discover new areas that can yield higher oil and gas production.

COAL SECTOR

Industry Profile

The Country has a total resource potential of 2,386 Million Metric Tons in various regions for exploration, development and production. The location of these areas and their reserve capacity and corresponding potentials are shown in Table 7 .

TABLE 7. 2012 SUMMARY OF REGIONAL COAL RESOURCES (IN METRIC TONS AS OF 31 DEC. 2012)

Area	Resource Potential	Positive Reserves	Probable Reserves	In-Situ Reserves	Mineable Reserves
Cagayan Valley	336,000,000	80,104,730	3,695,000	82,568,063	70,182,854
Cebu					
Central	40,000,000	3,354,055	4,763,160	6,529,495	3,917,697
Northern	75,000,000	2,229,719	655,727	2,666,870	1,600,122
Southern	50,000,000	1,163,176	1,870,206	2,409,980	1,445,988
Davao	100,000,000	208,000		208,000	124,800
Masbate	2,500,000	74,994		74,994	44,996
Mindoro	100,000,000	1,310,641	198,000	1,442,641	865,585
Negros	4,500,000	1,204,952	1,213,387	2,013,877	1,208,326
Polilo, Bataan and Catanduanes	17,000,000	4,947,709	1,604,675	6,017,492	3,610,495
Quezon	2,000,000	93,000		93,000	55,800
Samar	27,000,000	7,474,890	1,667,725	8,586,707	7,278,807
Semirara	570,000,000	90,674,437	43,820,358	119,888,009	101,904,808
Surigao	209,000,000	28,873,754	60,978,034	69,525,777	47,544,641
Zamboanga	45,000,000	33,991,157	5,984,679	37,980,943	22,788,566
Bukidnon	50,000,000				
Maguindanao	108,000,000				
Sarangani	120,000,000				
South Cotabato	230,400,000	35,093,186	68,959,017	81,065,864	48,639,518
Sultan Kudarat	300,300,000				
Total	**2,386,700,000**	**290,798,400**	**195,409,968**	**421,071,712**	**311,213,004**

In 2012, the local coal production of coal was recorded at 8.153 Million Metric Tons (MT) while the consumption in power plants, cement factories and industries was 16.163 Million MT. Coal is imported from Indonesia and Australia to augment the demand for coal in power plants. The annual statistics for coal is detailed in Table 8.

TABLE 8. OVERALL COAL STATISTICS IN THE PHILIPPINES (IN MILLION METRIC TONS), AS OF 2012

Year	Production	Importation	Consumption	Exportation
1977	0.285		0.245	
1978	0.254		0.259	
1979	0.263		0.233	
1980	0.329		0.281	
1981	0.331		0.27	
1982	0.558		0.332	
1983	1.02		1.057	
1984	1.216		1.692	
1985	1.262		2.393	
1986	1.236		1.844	
1987	1.208		2.019	
1988	1.358	1.33	2.538	
1989	1.36	1.075	2.133	
1990	1.243	1.344	2.234	
1991	1.326	1.435	2.833	
1992	1.661	1.103	2.565	
1993	1.582	1.273	2.847	
1994	1.449	1.113	2.897	
1995	1.329	1.71	3.116	
1996	1.108	2.983	4.197	
1997	1.076	4.248	5.189	
1998	1.157	4.282	5.624	
1999	1.177	4.858	6.416	
2000	1.353	6.814	8.762	
2001	1.23	7.601	8.184	
2002	1.665	6.417	8.008	
2003	2.03	7.035	8.153	
2004	2.726	7.51	9.667	
2005	3.163	6.656	10.036	
2006	2.588	7.344	10.062	
2007	3.737	7.729	10.215	0.799
2008	3.977	8.304	12.235	1.237
2009	5.176	7.026	12.063	2.262
2010	7.337	10.966	13.312	4.148
2011	7.611	10.879	14.234	2.736
2012	8.153	11.895	16.163	3.173
Total	**74.534**	**132.93**	**194.308**	**14.355**

Service Contracts

As of August 2013, there are 40 coal operating contracts (COC) for exploration and 31 COCs for development and production covering the areas of Luzon, Visayas and Mindanao. With the launching of the PECR4 in December 1, 2011 it is expected that there will be a big number of COCs that will be awarded to the winning bidders.

TABLE 9. COAL OPERATING CONTRACTS – EXPLORATION

No.	Name of Company	COC No.	Location of Mine
1	SKI-Construction Group, Inc.	136	Naga, Cebu
2	Philippine National Oil Company - Exploration Corporation	140	Cagwait and Marihatag, Surigao del Sur
3	Philippine National Oil Company - Exploration Corporation	141	Benito Soliven and Cauayan, Isabela
4	Guidance Management Corporation	151	Bayawan, Negros Occidental
5	Lima Coal Development Corporation	153	Bacon Gubat, Sorsogon
6	DMC-Construction Equipment Resources, Inc.	154	Bagumbayan, Sultan Kudarat
7	Titan Exploration & Development Corporation	158	Payao, Zamboanga
8	Titan Exploration & Development Corporation	159	Manay, Davao Oriental
9	ASK Mining & Exploration Corporation	162	Cagwait and Marihatag, Surigao del Sur
10	3Kings Sunrise Mining Corporation	165	Carmen, Cebu
11	Titan Exploration & Development Corporation	166	Diplahan-Buug, Zamboanga Sibugay
12	Titan Exploration & Development Corporation	168	Siay Zamboanga Sibugay
13	Blackgem Resources & Energy, Inc.	169	Tarragona, Davao Oriental
14	Dell Equipment & Construction Corporation	170	Saragani & South Cotabato
15	Cedaphil Mining Corporation	171	Toledo City, Cebu
16	Core 8 Mining Corporation	172	Toledo City, Cebu
17	BBB Mining & Energy Corp.	173	Asturias,Balamban,Danao, Cebu
18	Blackgem Resources & Energy, Inc.	174	Batan Island, Rapu-Rapu, Albay
19	Blackgem Resources & Energy, Inc.	175	Bangaga, Davao Oriental
20	Goodyield Resources Dev't, Inc,	176	Trento,Agusan Del Sur;Lingig,Surigao Del Sur;Boston, Davao Oriental
21	Goodyield Resources Dev't, Inc,	177	Godod, Zamboanga Del Norte
22	Kwangming Mineral Co., Inc.	178	Naga & Kabasalan,Zamboanga Sibugay
23	SKI Energy Resources, Inc.	179	Carmen, Asturias & Catmon, Cebu
24	SKI Energy Resources, Inc.	180	Pinamungahan, & Naga, Cebu
25	Timberwolves Resources, Inc.	181	Baang, Alegria & Gigaguit, Surigao Del Norte;Kitcharao, Agusan Del Norte

TABLE 10. COAL OPERATING CONTRACTS – DEVELOPMENT AND PRODUCTION

No.	Name of Company	COC No.	Location of Mine
1	Semirara Mining Corporation	5	Semirara Island, Caluya, Antique
2	Adlaon Energy Development Corporation	9	Bgy. Santicon, Balaas, Maloray & Manlapay, Municipality of Dalaguete & Argao, Cebu
3	Ibalong Resources Development Corporation (formerly Manguerra)	13	Mantalagon, Dalaguete, Cebu
4	Philippine National Oil Company - Exploration Corporation	41	Malangas, Zamboanga Sibugay
5	Filsystems, Inc.	68	Bulalacao, Mindoro Oriental
6	Filsystems, Inc.	77	Payao, Zamboanga Sibugay
7	Filsystems, Inc.	78	Payao and Siay, Zamboanga Sibugay
8	Benguet Corporation	83	Lianga, Marihatag & San Miguel, Surigao del Sur
9	Adlaon Energy Development Corporation	89	Adlaon, Cebu City
10	A Blackstone Energy Corp.	93	Lalat, Zamboanga Sibugay
11	Batan Coal Resources Corporation (formerly Rock Energy International, Inc.)	104	Batan Island, Rapu Rapu, Albay
12	D. M. Wenceslao and Associates, Inc.	116	Municipality of Baculud, Gattaran and Iguig, Cagayan Province
13	Philippine National Oil Company - Exploration Corporation	122	Cauayan, Isabela
14	D. M. Wenceslao and Associates, Inc.	123	Municipality of Baculud, Gattaran and Iguig, Cagayan Province
15	Lima Coal Development Corporation	125	Calanaga and San Ramon, Batan Island, Rapu-Rapu, Albay
16	Daguma Agro Minerals Inc.	126	Ned, Lake Sebu, South Cotabato and Sultan Kudarat
17	Bislig Venture Construction and Development Inc.	127	Bislig, Surigao del Sur
18	Ibalong Resources Development Corporation (formerly Manguerra)	128	Bilbao, Batan Island, Rapu-Rapu, Albay
19	SAMAJU Corporation	129	San Ramon, Batan Island, Rapu-Rapu Albay
20	Brixton Energy & Mining Corporation	130	Diplahan and Buug, Zamboanga Sibugay
21	Forum Cebu Coal Corporation	131	Dalaguete, Naga Cebu
22	First Asia Resource Mining Corporation (Formerly Forum Exploration Inc.)	132	Balamban, Cebu
23	Sultan Energy Phils. Corporation	134	Ned, Lake Sebu, South Cotabato & Sto. Niño, Bagumbayan, Sultan Kudarat
24	SKI-Construction Group, Inc.	135	Cahumayan, Portland & Dungga, Danao, Cebu
25	Batan Coal Resources Corporation (formerly Rock Energy International, Inc.)	137	Batan Island, Rapu Rapu, Albay
26	Bonanza Energy Resources, Inc.	138	Maitum, Saranggani Province & Ned, Lake Sebu, South Cotabato
27	Visayas Multi-Minerals Mining and Trading Corporation	142	Toledo, Cebu
28	Calatrava Coal Multi-Purpose Cooperative	144	Calatrava, Negros Occidental
29	Great Wall Mining and Power Corporation	145	San Miguel, Surigao del Sur
30	Abacus Coal Exploration and Dev't Corp.	148	Tago, Surigao del Sur
31	Il Rey'c Coal Mining Exploration Corp.	149	Danao City, Cebu

Philippine Energy Contracting Round

The PECR4 launched in December 1, 2011 offered 38 areas - 9 areas are located in Luzon. 3 areas in the Visayas and 26 areas in Mindanao.

NATURAL GAS

Industry Profile

The Malampaya gas field in offshore Palawan which has a contracted volume of 2.7 trillion cubic feet (TCF) natural gas to its customers is currently the biggest and the second commercial gas discovery and the sole source of natural gas in the country. Another gas field, the Libertad Gas Field in Cebu, commercially operated in 2012 and contributed significantly to the current gas production. The gas field has a minimum estimated recoverable reserve of 0.6 BCF and scheduled to produce 88.47 mmscf of gas per year. These milestones are summarized in Figure 10. Currently, natural gas is utilized in the power, industrial and transport sectors.

FIGURE 10. MILESTONES OF NATURAL GAS DEVELOPMENT IN THE PHILIPPINES

1991	Discovery of the Malampaya Gas Field in Palawan
1994	Production of 2.7 BCF from San Antonio Gas Field, Isabela. Ceased production in 2008
2001	Commissioning of Malampaya Gas Field and Launching of Gas-to-Power Project
2002	Production of 2.7 TCF from Malampaya Gas Field, Palawan. Commercial operation of the 2,700 MW gas-fired power plants in Batangas
2006	Declaration of commercial viability (0.6 BCF) of Libertad Gas Field
2012	Commercial Production of Libertad Gas Field supplying natural gas to a 1MW mine mouth natural gas fired power plant

The existing three (3) gas-fired power plants in Batangas with a combined capacity of 2,700 MW remains the major users of natural gas produced from Malampaya gas field. Specifically, these power plants are the 1,200 MW Ilijan (KEPCO-Ilijan Cooperation), 1,000 MW Sta. Rita (First Gas Power Corporation) and the 500 MW San Lorenzo (First Gas Power Corporation). These plants consumed a total of 133,226 mmscf in 2011 and provided 37% of the total electric power supply in the Luzon grid and 30% of the country's generation mix.

At present, Pilipinas Shell Petroleum Corporation's oil refinery uses natural gas to fuel its gas turbine generators as well as provides supplemental supply to its low-pressure fuel gas system. In 2011, the aggregate gas consumption was reported at 3,287 mmscf.

Further, 41 public utility buses are currently running on compressed natural gas (CNG) under the government's pilot program. These buses are plying the routes of Batangas, Laguna to Metro Manila. Currently, the CNG mother and daughter refueling stations in Tabangao, Batangas and in Mamplasan South Luzon Expressway in Biñan, Laguna respectively provide the CNG requirement for these buses using two (2) ST4 trailer trucks and Modular Accumulator Transport System. (MATS) to transport CNG supply from the mother to the daughter refueling stations. In 2011, the transport sector consumed 46.50 mmscf of natural gas.

Gas Supply and Market Potential

The Malampaya gas field is programmed to produce 146 BCF of gas per year. Aggregate gas production in 2011 from Malampaya gas field reached 140 BCF while its cumulative gas production starting from its commercial operation to present is recorded at 1.2 TCF.

Nonetheless, the Malampaya reservoir is expected to decline to such a level that the current facilities would not be able to meet the export gas flow rate required by the existing gas sales agreement. The Malampaya Phase 2 (MP2) development that will be implemented in 2013 will consist of infill wells at the Malampaya reservoir to maintain plateau production levels. Two (2) wells are planned to be developed which will be tied into the existing Malampaya 10 slot manifold. Some minor modifications are required on Shallow Wall Production (SWP) mainly to configure the subsea control and automation system for the new wells.

FIGURE 11. ONE BIG BUSINESS OPPORTUNITY

To augment the projected demand beyond the 400 mmscfpd production from the Malampaya gas field, the DOE promotes the balance development of liquefied natural gas (LNG) importation in parallel with the exploration of indigenous natural gas. As such, Energy World Corporation (EWC) Limited, an Australian company, is currently undertaking activities in preparation for the construction of its Pagbilao LNG Hub Terminal in Pagbilao Grande Island, Quezon. The LNG import terminal and regasification facility which includes a 300 MW Combined Cycle Gas Turbine power plant is expected to commence operation in early 2014. In addition, several companies have likewise indicated interest to put up LNG power plants, terminals and floating storage and regasification units (FSRUs) in in Luzon and Mindanao.

It is projected that the demand for natural gas will come mainly from the power generation sector, transport and industrial sectors. The use of natural gas in the country will remain concentrated in Luzon while utilization will also be expected in Mindanao and Visayas. Table 12 shows the potential market for natural gas.

TABLE 12. NATURAL GAS MARKET POTENTIAL

Market Sector	Luzon	Visayas	Mindanao	Total
Power (2011 - 2030)	13,100 MW	2,150 MW	2,500 MW	17,750 MW
Transport (2011-2030)	31,000 units of CNG vehicles by 2030 ; 15,000 CNG buses and 16,000 taxis. (5,000 units of CNG buses and 100 taxis in Luzon by 2016)			31,000 units
Industry	International locators in Special Economic Zones			

Note: Power requirement in Luzon includes potential conversion capacity of 1200 MW

Investment Opportunities

In line with the government's direction to make gas available to a wider base of customers, putting up of the strategic infrastructure network in Luzon will be among the projects to pursue in partnership with the private sector. The gas infrastructure projects such as Batangas to Manila (Batman 1) and LNG Terminal in Batangas are two priority projects to be implemented. However, for other projects, the target date is assumed as a chain result to the operation of Batman 1. On the other hand, the identified infrastructure projects in Mindanao are the distribution options recommended by the World Bank Study to bring the supply of natural gas to potential customers in PHIVIDEC, Cagayan de Oro and Iligan under the first phase development of the project and to General Santos and Davao for the second phase.

Luzon Critical Infrastructure Projects

Refilling Stations	Target Year
CNG Refilling Stations in Metro	2013-2015
Liquified Natural Gas (LNG) Terminals	**Target Year**
LNG Hub Terminal in Pagbilao, Quezon	2013-2014
LNG Terminal in Batangas	2021-2030
LNG Terminal in Bataan	2025
Pipeline Projects	**Target Year**
105 km. Batangas-Manila (BatMan 1) Pipeline	2015-2017
15 km. Sucat-Fort Bonifacio Pipeline	2017
35 km. Sucat-Malaya (Su-Ma) Pipeline	2017
38 km. Sucat-Quirino Pipeline	2020
140 km. Bataan-Manila (Batman2) Pipeline	2020
40 km. Metro Manila/Edsa-Taft Gas Pipeline - ET Loop	2020
40 km. Subic Pipeline (from proposed BatMan2 to Subic)	2021
25 km. Clark Pipeline (from proposed BatMan2 to Clark)	2022
40 km. Bataan-Cavite (Batcave) Pipeline	2022

Note: Said targets are still subject to review based on current socio-economic conditions.

Mindanao Critical Infrastructure Projects, Phase 1

Floating Storage & Regasification Unit (FSRU)	Target Year
FSRU Facility in Macajalar Bay, Misamis Oriental	2014-2016
Pipeline Projects	**Target Year**
27.4 km. Pipeline System for Cagayan de Oro and PHIVIDEC Area	2014-2016
2x2 km. Distribution Pipeline in Iligan City	2014-2016
Storage Facility	**Target Year**
Satellite Supply Terminal (2 storage tanks each with 120 cu.m. in South Iligan	2014-2016
Satellite Supply Terminal (1 storage tank each with 120 cu.m. in North Iligan	2014-2016
Refilling Facility	**Target Year**
Liquefied Compressed Natural gas (LCNG) Refueling Station in Iligan City, CDO and Phividec Areas	2016-2017

Note: Said Targets are still subject for review based on current socio-economic conditions.

Mindanao Critical Infrastructure Projects, Phase II

Liquefied Natural Gas (LNG) Terminals	Target Year
53 km. Pipeline from Marine Barge System to Industries in General Santos	2016-2018
Liquefied Compressed Natural Gas (LCNG) Refueling Stations in General Santos and Davao	2016-2018
3 Satellite LNG Terminals in Davao via General Santos	2018-2020

Note: Said Targets are still subject for review based on current socio-economic conditions.

ALTERNATIVE FUELS

The Department of Energy (DOE) encourages both public and private transport sectors to shift from gasoline and diesel-fed modes of transport to compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG) and electric power. This will mitigate the impact of oil price hike and reduce the country's dependence on oil.

Natural Gas Vehicle Program for Public Transport (NGVPPT)

NGVPPT promotes the utilization of CNG in the transport sector. As of 1st quarter of 2013, the country has seven (7) bus operators accredited by the DOE under the NGVPPT namely: HM Transport, Inc.; KL CNG Bus Transport; BBL Trans System Corporation; Greenstar CNG Express, Inc.; RRCG Transport System Company; N. Dela Rosa Liner, Inc. and JAM Liner. At present, there are sixty-one (61) commercial CNG buses: 34 units with franchise and 27 units awaiting franchises to operate. These CNG buses ply the routes of Batangas, City/ Calamba Laguna going to Lawton, Manila/Cubao, Quezon City.

The Philippine National Oil Company – Exploration Company (PNOC-EC) will put up two (2) modular daughter stations in Laguna and Batangas City.

By the end of 2016, 1000 commercial buses is envisioned to be available nationwide with a total investment requirement of Php 5 billion. To achieve the target 1000 commercial buses to be available nationwide from 2012 to 2016, there should be eight (8) modular daughter stations to be built that would cost Php 520 million. The cost is based on the assumption that one (1) CNG refueling station can supply gas to 100-125 buses per day, 50 percent of which can be fueled twice a day while the remaining 50 percent can be fueled once a day.

Table 13 shows the annual CNG buses investment requirement for 2012 - 2016 as well as, its CNG Refueling Station requirements.

TABLE 13. CNG BUSES AND DAUGHTER STATIONS INVESTMENT REQUIREMENT (2012 – 2016)

Year	No. of CNG Buses	Investment Requirement @ PhP 5 million per unit (Million PhP)	CNG Modular Daughter Station Requirement	Investment Requirement @ PhP 65 million per station (Million PhP)
2012	200	1,000	-	-
2013			2	130
2014	300	1,500	2	130
2015	250	1,250	2	130
2016	250	1,250	2	130
Total	**1000**	**5,000**	**8**	**520**

*61 CNG buses are currently available with 34 units w/ franchise & 27 awaiting franchise to operate

Auto-LPG

Liquified Petroleum Gas (auto-LPG) as transport fuel is cleaner and more economical compared to diesel or gasoline. Based on DOE's oil price monitoring effective December 3, 2013, Auto-LPG retail prices in Metro Manila ranged from Php 38.00 - 41.50 per liter while gasoline prices were from Php 47.80 - 61.05 per liter. Thus, utilizing auto-LPG would provide Php 9.80 - 19.55 savings on fuel cost.

Last March 18 2011, the Department of Energy entered into a Memorandum of Understanding (MOU) with various public transport groups on "Adopt an Eco-Jeepney Program". The MOU targets the modernization of the transportation in the country, particularly diesel-fed passenger jeepneys through the introduction of auto-LPG-fed or compressed natural gas (CNG)-fed engines.

Currently, a Memorandum of Agreement is being forged between DOE and UP National Engineering Center (NEC) to conduct laboratory and on-road tests to determine the engine performance of auto-LPG repowered jeepney and to evaluate the economic viability of the auto-LPG Program as a whole. The DOE with Pasang Masda will provide the test vehicles to UP NEC.

As of end 2012, there are 13,202 units of taxis converted to Auto-LPG, the reduction in actual number of converted taxis from 19, 052 to current numbers were due to expiration of extended franchises.

Critical to the sustainability of the auto-LPG program is the establishment of auto-LPG stations in the country. As of April 2013, there are 224 auto-LPG stations nationwide consisting of 151 public stations, 67 garage-based stations and 6 bulk suppliers as shown in Table 14.

TABLE 14. AUTO LPG STATIONS

Area/Region	Public	Garage Based	Bulk Suppliers
Metro Manila	102	35	0
Luzon	7	2	4
Visayas	26	19	1
Mindanao	16	11	1
Total	**151**	**67**	**6**

TABLE 15. AUTO-LPG CONVERSION INVESTMENT REQUIREMENT

Type of Vehicle Engine for Conversion	Investment Cost (PhP)
Carburetor type	24,000 - 28,000
Electronic Fuel Injection (EFI)	28,000 - 30,000
Sequential Gas Injection (SGI)	38,000 - 40,000
8 Cylinder-engine with SGI	58,000 - 60,000
Auto-LPG Jeepney-Repowering	250,000 - 375,000
Auto-LPG Jeepney Acquisition (5unit @Php 1.5M)	7, 500,000

* Prices may vary depending on the cylinder capacity and/or brand of conversion kit
** Costs as of January 2011

Conversion of gasoline vehicles to auto-LPG vehicles requires the installation of gas injectors, vapouriser unit, engine control unit and fuel tank. Once the vehicle is converted, it could run either on gasoline or Auto-LPG. Table 15 provides the cost of the conversion equipment according to the vehicle type.

Electric Vehicles

Electric vehicles, such as E-Jeepneys and E-Tricycles, are increasing in popularity as a viable and clean alternative transport technology. Moreover, the Asian Development Bank (ADB)-funded Electric Tricycles (E-Trike) Pilot Project in Mandaluyong City, launched in May 2011, yielded very good economic returns for the drivers in terms of fuel savings and higher net take home pay.

- 3 wheeled vehicle
- 5 passenger s(excluding driver)
- 3kw electric motor @ 60kph
- Lithium-ion battery
- On-board charger
- Battery management system (BMS)
- Able to negotiate 16 degree slope terrain

As an offshoot of this, the DOE is forging a tie-up with selected local government units (LGUs) and government financing institutions to implement the Market Transformation through the Introduction of Energy Efficient Electric Vehicles otherwise known as the "E-trike project." A business model has been formulated to implement a rent-to-own program nationwide. The E-Trike project aims to replace the old and inefficient two-stroke gasoline fed tricycles. This involves the deployment of 100,000 e-trikes nationwide with the initial distribution of 3,000 units in Year 1. Table 16 contains the timeline and number of E-trikes to be distributed.

TABLE 16. E-TRIKE IMPLEMENTATION PLAN

Year	No. of Units for Distribution
Year 1	3,000
Year 2	17,000
Year 3	30,000
Year 4	30,000
Year 5	20,000
Total	**100,000**

Table 17 provides the cost per unit of various locally available Electric Vehicles and for putting up Charging Station facility.

TABLE 17. ELECTRIC VEHICLES INVESTMENT REQUIREMENT

Types of Electric Vehicles	Investment Cost (PhP)
Charging Station	1,200,000 - 2,500,000
Electric Jeepney (Lead acid type batteries)	600,000 - 700,000
Electric Tricycle (Lead acid type batteries)	150,000 - 180,000
Electric Tricycle (Lithium-ion type batteries)	200,000 - 250,000
Electric Bikes	25,000 - 55,000
Electric Bus	7,000,000 - 8,000,000

RENEWABLE ENERGY

Industry Profile

The Renewable Energy (RE) Law of 2008 aims to accelerate the development of the country's renewable energy resources by providing fiscal and non-fiscal incentives to RE developers, manufacturers, fabricators and suppliers of locally produced RE development and components.

As of October 31, 2013, there are 370 service contracts awarded to various RE companies and the details are provided in Table 18. These contracts have a total potential capacity of 6,065.066 MW and an installed capacity of 2,330.44 MW.

TABLE 18. AWARDED SERVICE CONTRACTS (AS OF OCTOBER 31, 2013)

Resources	Awarded Projects		Potential Capacity, MW		Installed Capacity, MW	
	Grid - Use	Own - Use	Grid - Use	Own - Use	Grid - Use	Own - Use
Hydro Power	201	1	2,806.38	1.50	131.22	-
Ocean Energy	3	-	5.00	-	-	-
Geothermal	39	-	870.0	-	1,847.69	-
Wind	37	1	1,753.5	0.006	33.00	-
Solar	34	4	482.706	1.574	-	
Biomass	28	23	11.60	32.80	146.35	172.18
Sub - Total	**342**	**29**	**6,029.186**	**35.88**	**2,158.26**	**172.18**
Total	**371**		**6,065.066**		**2,330.44**	

On the other hand, Table 19 shows that as of September 30, 2013 there are a total of 371 pending contracts that are either currently under evaluation or awaiting completion of documents from the proponent.

TABLE 19. PENDING RE SERVICE CONTRACT APPLICATIONS (AS OF SEPTEMBER 30, 2013)

Resources	Pending Applications		Potential Capacity, MW		Installed Capacity, MW	
	Grid - Use	Own - Use	Grid - Use	Own - Use	Grid - Use	Own - Use
Hydro Power	195		2,392.95		553.60	
Ocean Energy	4		-			
Geothermal	5		60.0		-	
Wind	12		341.0		-	
Solar	30	1	576.0	0.020		
Biomass	13	1	152.9	0.50	8.60	
Sub - Total	**259**		**3,522.85**	**0.52**	**562.20**	**-**
Total	**371**		**3,523.37**		**562.20**	

Additional mechanisms are already in place to further boost RE development such as the installation targets for each RE resource set by the National Renewable Energy Board (NREB) and the Feed-in Tariff (FIT) Rates approved by the Energy Regulatory Commission as shown in Table 20.

TABLE 20. FEED-IN TARIFF RATES AND INSTALLATION TARGETS

Resource/Technology	ERC Approved FIT Rates		Installation Targets
	(PhP/kWh)	($/KWH)	
Run-of-River Hydropower	5.9	0.14	250
Biomass Energy	6.63	0.15	250
Wind Power	8.53	0.19	200
Solar Power	9.68	0.22	50
Ocean Energy	-	-	10
Total			**760**

Exchange Rate: 1 USD = PhP 43.00

The progress of the RE applications particularly on the declaration of commerciality are closely monitored and the information is summarized in Table 21 which is also uploaded at www.doe.gov.ph

TABLE 21. FIT MONITORING BOARD (AS OF NOVEMBER 22, 2013)

Resource	For Conversion (With Declaration of Commerciality)		With Certificate of Confirmation of Commerciality	
	No. of Projects	Capacity, MW	No. of Projects	Capacity, MW
Hydro Power	27	167.10	24	211.55
Wind	5	217.0	6	389.50
Solar	8	80.0	3	80.0
Biomass	6	50.5	5	46.3
Total	**46**	**514.60**	**38**	**727.35**

Geothermal Energy

Being the second largest producer of geothermal energy in the world, the Philippines has a total installed capacity of 1,838 MW. The Visayas area provides 915 MW, Luzon 824 MW and Mindanao area 108 MW.

Under the Renewable Energy (RE) Law, the RE Developer may apply for a Geothermal RE Service Contract (GRESCs)/Operating Contract (GREOC) and those with existing Geothermal Service Contracts (GSCs) under the Presidential Decree 1442 may opt to convert into RE Contracts. Geothermal RE Service Contracts are issued for the exploration and development of geothermal steam fields while Geothermal RE Operating Contracts are issued to the operators of geothermal power plants.

As of October 31, 2013, there are 39 active Geothermal RE Service and Operating Contracts as listed in Table 22.

TABLE 22. AWARDED GEOTHERMAL PROJECTS (AS OF 31 OCTOBER 2013)

A. INSTALLED CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			824.03
1	Mak-Ban Geothermal Project	Batangas / Laguna	AP Renewables Inc.	458.53
2	Tiwi Geothermal Power Project	Albay	AP Renewables Inc.	234.00
3	Bacon – Manito Geothermal Power Project	Sorsogon / Albay	Bac – Man Geothermal Inc.	131.50
	VISAYAS			305.0
4	Tongonan 1 Geothermal Power Plant	Leyte	Green Core Geothermal Inc.	112.50
5	Palinpinon Geothermal Power Plant	Negros Oriental	Green Core Geothermal Inc.	192.50
	Total			**1,129.03**

B. PRODUCTION FIELD

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	VISAYAS			**610.18**
1	Bacon – Manito Geothermal Production Field	Sorsogon / Albay	Energy Development Corporation	TBD
2	Leyte Geothermal Production Field	Leyte	Energy Development Corporation	610.18
3	Northern Negros Geothermal Production Field	Negros Occidental	Energy Development Corporation	TBD
4	Southern Negros Geothermal Production Field	Negros Oriental	Energy Development Corporation	TBD
	MINDANAO			**108.48**
5	Mindanao Geothermal Production Field	North Cotabato / Davao del Sur	Energy Development Corporation	108.48
	Total			**718.66**

C. DEVELOPMENT STAGE

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**20.00**
1	Maibarara Geothermal Project	Batangas / Laguna	Maibarara Geothermal Inc.	20.00
	Grand Total			**20.00**

D. PRE DEVELOPMENT STAGE

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**640.0**
1	Sal-lapadan-Boliney-Bucloc-Tubo Geothermal Power Project	Abra	Pan Pacific Power Phils. Corp.	TBD
2	Buguias-Tinoc Geothermal Project	Benguet / Ifugao	PRC Magma Energy Resources Inc.	60.0
3	Daklan Geothermal Project	Benguet / Nueva Ecija	Clean Rock Renewable Energy Resources	60.0
4	Kalinga Geothermal Project	Kalinga	Aragorn Power and Energy Corporation	120.0
5	Mainit-Sadanga Geothermal Project	Mountain Province	PRC Magma Energy Resources Inc.	80.0
6	East Mankayan Geothermal Power Project	Benguet / Ifugao / Mountain Province	Basic Energy	TBD
7	Cervantes Geothermal Power Project	Benguet / Ifugao / Mountain Province	Pan Pacific Power Phils. Corporation	TBD
8	Cagua – Baua Geothermal Project	Cagayan	Pan Pacific Power Phils. Corporation	45.0
9	Mariveles Geothermal Power Project	Bataan	Basic Energy	TBD
10	Negron-Cuadrado Geothermal Power Project	Zambales / Pampanga	AP Renewables	TBD
11	Natib Geothermal Power Project	Bataan	Clean Rock Renewable Energy Resources	40.0
12	San Juan Geothermal Power Project	Batangas	SKI Construction Group, Inc.	20.0
13	Tiaong Geothermal Power Project	Laguna / Batangas / Quezon	SKI Construction Group, Inc.	TBD
14	Tayabas – Lucban Geothermal Power Project	Tayabas, Quezon	SKI Construction Group, Inc.	TBD
15	Makban Geothermal Power Project	Laguna / Batangas	Philippine Geothermal Production Company, Inc.	TBD
16	Montelago Geothermal Project	Oriental Mindoro	Constellation Energy Corporation	40.0
17	Tiwi Geothermal Power Project	Albay	Philippine Geothermal Production Company, Inc.	TBD
18	Camarines Sur Geothermal Project	Camarines Sur	PNOC – Renewables Corporation	70.0
19	Iriga Geothermal Power Project	Camarines Sur	Basic Energy Corp.	TBD
20	Mt. Labo Geothermal Project	Quezon / Camarines Sur & Norte	Energy Development Corporation	65.0
21	Southern Bicol Geothermal Project	Sorsogon	SKI Construction Group, Inc.	40.0
	VISAYAS			**70.0**
22	Mandalagan Geothermal Power Project	Negros Occidental	Energy Development Corporation	20.0
23	Biliran Geothermal Project	Biliran	Biliran Geothermal Inc.	50.0

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	MINDANAO			**140.0**
24	Mainit Geothermal Project	Surigao del Norte	Energy Development Corporation	30.0
25	Lakewood Geothermal Power Project	Zamboanga del Sur / Zamboanga del Norte / Zamboanga Sibugay	Energy Development Corporation	40.0
26	Ampiro Geothermal Power Project	Misamis Occidental / Zamboanga del Norte / Zamboanga del Sur	Energy Development Corporation	30.0
27	Balingasag Geothermal Project	Misamis Oriental / Bukidnon	Energy Development Corporation	20.0
28	Mt. Zion Geothermal Power Project	North Cotabato / Davao del Sur	Energy Development Corporation	20.0
	Total			**850.0**

Hydropower

Currently, the country has an installed capacity of 3,520 MW for hydro resources. Luzon generates 2,462 MW, Visayas 11 MW and Mindanao 1,047 MW.

As of October 31, 2013, 201 Hydro Service Contracts were awarded which have a total potential capacity of 2,857.08 MW. As summarized in Table 23, there are 120 contracts in Luzon, 31 in the Visayas and 50 in Mindanao.

TABLE 23. AWARDED HYDROPOWER PROJECTS (AS OF 31 OCTOBER 2013)

A. INSTALLED CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**116.15**
1	FLS Hydroelectric Power Plant	Bakun, Benguet	Hedcor, Inc.	5.90
2	Lon-oy Hydroelectric Power Plant	Bakun, Benguet	Hedcor, Inc.	3.60
3	Lower Labay Hydroelectric Power Plant	Bakun, Benguet	Hedcor, Inc.	2.40
4	Sal-angan Hydroelectric Power Plant	Itogon, Benguet	Hedcor, Inc.	2.40
5	Bineng 2 Hydroelectric Power Plant	La Trinidad, Benguet	Hedcor, Inc.	1.80
6	Bineng 2B Hydroelectric Power Plant	La Trinidad, Benguet	Hedcor, Inc.	0.75
7	Bineng 3 Hydroelectric Power Plant	La Trinidad, Benguet	Hedcor, Inc.	4.50
8	Bineng 1 Hydroelectric Power Plant	La Trinidad, Benguet	Hedcor, Inc.	3.20
9	Ampohaw Hydroelectric Power Plant	Sablan, Benguet	Hedcor, Inc.	8.0
10	Irisan 1 Hydroelectric Power Plant	Tuba, Benguet	Hedcor, Inc.	3.8
11	Irisan 3 Hydroelectric Power Plant	Tuba, Benguet	Hedcor, Inc.	1.2
12	Ambangal Hydroelectric Power Plant	Kiangan, Ifugao	Provincial Government of Ifugao	0.20
13	Bakun AC Hydroelectric Power Plant	Alilem, Ilocos Sur	Luzon Hydro Corporation	70.0

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**116.15**
14	Commonal – Uddiawan Hydroelectric Power Project	Solano, Nueva Vizcaya	Smith Bell Mini-Hydro Corporation	1.80
15	Linao – Cawayan (Lower Cascade) Hydroelectric Power Project	Baco, Oriental Mindoro	Oriental Mindoro Electric Coop. Inc.	2.10
16	Cantingas Hydroelectric Power Project	Romblon, Romblon	Romblon Electric Cooperative Inc.	0.90
17	Hitoma 1 Hydroelectric Power Project	Caramoran, Catanduanes	Sunwest Water & Electric Company, Inc.	1.50
18	Solong Hydroelectric Power Project	San Miguel, Catanduanes	Sunwest Water & Electric Company, Inc.	2.10
	VISAYAS			**1.20**
19	Loboc Hydroelectric Power Project	Loboc, Bohol	Sta. Clara Power Corporation	1.20
	MINDANAO			**13.87**
20	Agusan River Hydroelectric Power Plant	Manolo Fortich, Bukidnon	FG Bukidnon Power Corp.	1.60
21	Cabulig Hydroelectric Power Project	Claveria, Misamis Oriental	Mindanao Energy Systems, Inc.	8.0
22	Talomo 1 Hydroelectric Power Project	Calinan, Davao del Sur	Hedcor, Inc.	1.10
23	Talomo 2 Hydroelectric Power Project	Davao City	Hedcor, Inc.	0.60
24	Talomo 2A Hydroelectric Power Project	Davao City	Hedcor, Inc.	0.65
25	Talomo 3 Hydroelectric Power Project	Pequeno, Davao del Sur	Hedcor Inc.	1.92
	Total			**131.22**

B. HYDROPOWER PROJECTS WITH ON-GOING CONSTRUCTION

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**2.10**
1	Linao – Cawayan (Upper Cascade) Hydroelectric Power Project	Baco, Oriental Mindoro	Oriental Mindoro Electric Coop. Inc.	2.10
	VISAYAS			**10.0**
2	Villasiga Hydroelectric Power Project	Bugasong, Antique	Sunwest Water & Electric Company, Inc.	8.0
3	Guiamon San Ramon Hydroelectric Power Project	Laua-an, Antique	Sunwest Water & Electric Company, Inc.	2.0
	Total			**12.10**

C. DEVELOPMENT CONTRACT

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**2.10**
1	Ibulao Hydroelectric Power Plant	Lagawe, Ifugao	Hydrocore, Inc.	4.5
2	Tinoc 1 Hydroelectric Power Project	Tinoc, Ifugao	QuadRiver Energy Corporation	4.1
3	Tinoc 4 Hydroelectric Power Project	Tinoc, Ifugao	Philnew Hydro Power Corporation	5.0
4	Pinacanauan River Hydroelectric Power Project	Peñablanca, Cagayan	Sunwest Water & Electric Company, Inc.	8.0
5	Dupinga Hydroelectric Power Project	Gabaldon, Nueva Ecija	Constellation Energy Corporation	3.0
	VISAYAS			**65.0**
6	Main Aklan River Hydroelectric Power Project	Libacao, Aklan	Sunwest Water & Electric Company, Inc.	15.0
7	Timbaban Hydroelectric Power Project	Madalag, Aklan	Oriental Energy and Power Generation Corp.	18.0
8	Maninila (Lower Cascade) Hydroelectric Power Project	San Remegio, Antique	Century Peak Energy Corporation	4.5
9	Maninila (Upper Cascade) Hydroelectric Power Project	San Remegio, Antique	Century Peak Energy Corporation	3.1
10	Sibalom (Lower Cascade) Hydroelectric Power Project	San Remegio, Antique	Century Peak Energy Corporation	3.3
11	Sibalom (Middle Cascade) Hydroelectric Power Project	San Remegio, Antique	Century Peak Energy Corporation	4.0
12	Sibalom (Upper Cascade) Hydroelectric Power Project	San Remegio, Antique	Century Peak Energy Corporation	4.2
13	Igbulo (Bais) Hydroelectric Power Project	Igbaras, Iloilo	Century Peak Energy Corporation	5.1
14	Hilabangan (Lower Cascade) Hydroelectric Power Project	Kabankalan, Negros Occidental	Century Peak Energy Corporation	3.0
15	Hilabangan (Upper Cascade) Hydroelectric Power Project	Kabankalan, Negros Occidental	Century Peak Energy Corporation	4.8
	MINDANAO			**120.75**
16	Tumalaong Hydroelectric Power Project	Baungon, Bukidnon	First Gen Mindanao Hydro Power Corp.	9.0
17	Bubunawan Hydroelectric Power Project	Baungon and Libona, Bukidnon	First Gen Mindanao Hydro Power Corp.	7.0
18	Tagoloan Hydroelectric Power Project	Impasugon and Sumil, Bukidnon	First Gen Mindanao Hydro Power Corp.	39.0
19	Culaman Hydroelectric Power Project	Manolo Fortich, Bukidnon	Oriental Energy and Power Generation Corp.	10.0
20	Limbatangon Hydroelectric Power Plant	Cagayan de Oro City	Turbines Resources & Development Corp.	9.0
21	Tudaya 2 Hydroelectric Power Project	Sta. Cruz, Davao del Sur	Hedcor Tudaya, Inc.	7.0
22	Cabadbaran Hydroelectric Power Project	Cabadbaran, Agusan del Norte	First Gen Mindanao Hydro Power Corp.	9.75
23	Puyo Hydroelectric Power Project	Jabonga, Agusan del Norte	First Gen Mindanao Hydro Power Corp.	30.0
	Total			**210.35**

D. HYDROPOWER PROJECTS WITH DECLARATION OF COMMERCIALITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**114.2**
1	Kapangan Hydroelectric Power Plant	Kapangan & Kibungan, Benguet	Cordillera Hydro Electric Power Corp.	60
2	Abdao Hydroelectric Power Plant	Tabaan Sur, Tuba, Benguet	AV Garcia Power Systems Corp.	9.0
3	Tinoc 2 Hydroelectric Power Project	Tinoc, Ifugao	QuadRiver Energy Corporation	6.5
4	Tinoc 3 Hydroelectric Power Project	Tinoc, Ifugao	QuadRiver Energy Corporation	5.0
5	Dummon River Lower Cascade Hydroelectric Power Project	Gattaran, Cagayan	Sunwest Water & Electric Company, Inc.	2.0
6	Dummon River Upper Cascade Hydroelectric Power Project	Gattaran, Cagayan	Sunwest Water & Electric Company, Inc.	2.0
7	Tumauini Hydroelectric Power Project (Lower Cascade)	Tumauini, Isabela	QuadRiver Energy Corporation	6.0
8	Tumauini Hydroelectric Power Project (Upper Cascade)	Tumauini, Isabela	Philnew Hydro Power Corporation	14.0
9	Matuno Hydroelectric Power Project	Bambang, Nueva Vizcaya	Epower Technologies Corp.	8.0
10	Cumagingking Falls Hydroelectric Power Project	Malinao, Albay	Sunwest Water & Electric Company, Inc.	0.2
11	Vera Falls Hydroelectric Power Project	Malinao, Albay	Sunwest Water & Electric Company, Inc.	0.3
12	Coyaoyao (Middle Cascade) Hydroelectric Power Project	Sagnay, Camarines Sur	SKI Mini-Hydro Corporation	0.3
13	Coyaoyao (Upper Cascade) Hydroelectric Power Project	Sagnay, Camarines Sur	SKI Mini-Hydro Corporation	0.4
14	Coyaoyao (Lower Cascade) Hydroelectric Power Project	Sagnay, Camarines Sur	SKI Mini-Hydro Corporation	0.5
	VISAYAS			**17.1**
15	Tibiao Hydroelectric Power Project	Culasi, Antique	Sunwest Water & Electric Company, Inc.	2.1
16	Dalanas Hydroelectric Power Project	Barbaza, Antique	Sunwest Water & Electric Company, Inc.	3.0
17	Malogo Hydroelectric Power Project	Silay, Negros Occidental	ViVant Corporation	6.0
18	Basak II Hydroelectric Power Project	Basak, Cebu	Meadowland Developers, Inc.	0.5
19	Amlan (Plant A) Hydroelectric Power Project	Amlan, Negros Oriental	Natural Power Sources Integration, Inc.	3.2
20	Amlan (Plant B) Hydroelectric Power Project	Amlan, Negros Oriental	Natural Power Sources Integration, Inc.	1.5
21	Amlan (Plant C) Hydroelectric Power Project	Amlan, Negros Oriental	Natural Power Sources Integration, Inc.	0.8
	MINDANAO			**24.0**
22	Cagayan de Oro Hydroelectric Power Project	Baungon, Bukidnon	Epower Technologies Corporation	8.0
23	Manupali Hydroelectric Power Plant	Valencia, Bukidnon	Matic Hydropower Corporation	9.0
24	Mat-i 1 Hydroelectric Power Project	Cagayan de Oro	PhilNew Hydro Power Corporation	2.0
25	Clarin Hydroelectric Power Plant	Clarin, Misamis Occidental	PhilNew Hydro Power Corporation	5.0
	Total			**155.30**

E. HYDROPOWER PROJECTS IN PRE DEVELOPMENT STAGE

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**2,126.99**
1	Man-asok Hydroelectric Power Plant	Buguias, Benguet	Benguet Electric Cooperative, Inc.	1.60
2	Natalang B Hydroelectric Power Plant	Kabayan, Benguet	PNOC - Renewables	45.0
3	Kapangan I Hydroelectric Power Plant	Kapangan, Benguet	Cordillera Hydro Electric Power Corp.	19.90
4	Kapangan II Hydroelectric Power Plant	Kapangan, Benguet	Cordillera Hydro Electric Power Corp.	38.40
5	Sabangan Hydroelectric Power Plant	Sabangan, Benguet	Hedcor Sabangan, Inc.	13.20
6	Tadiangan	Tuba, Benguet	Goldlink Global Energy Corporation	4.70
7	Kanggas	Tuba, Benguet	Goldlink Global Energy Corporation	3.0
8	Asin	Kiangan, Ifugao	Enerhighlands Corporation	4.0
9	Hungduan	Kiangan, Ifugao	Enerhighlands Corporation	4.0
10	Ibulao 1	Kiangan, Ifugao	Enerhighlands Corporation	6.0
11	Ibulao 1	Kiangan, Ifugao	Enerhighlands Corporation	8.0
12	Lamut	Lamut, Ifugao	Enerhighlands Corporation	9.0
13	Tinoc 5 (Lower Luhong) Hydroelectric Power Project	Tinoc, Ifugao	Sta. Clara Power Corporation	6.0
14	Tinoc 6 (Wangwang) Hydroelectric Power Project	Tinoc, Ifugao	Sta. Clara Power Corporation	6.0
15	Saltan B Hydroelectric Power Project	Balbalan, Kalinga	PNOC – Renewables Corporation	24.0
16	Pasil B Hydroelectric Power Project	Pasil, Kalinga	PNOC – Renewables Corporation	20.0
17	Pasil C Hydroelectric Power Project	Pasil, Kalinga	PNOC – Renewables Corporation	22.0
18	Bulanao	Tabuk, Kalinga	DPJ Engineers and Consultants	1.0
19	Upper Tabuk Hydroelectric Power Project	Tabuk, Kalinga	Kalinga, Hydropower, Inc.	10.0
20	Tinglayan Hydroelectric Power Project	Tinglayan, Kalinga	Pan Pacific Renewable Power Phils., Corp.	4.32
21	Apayao – Abulog Hydroelectric Power Plant	Kabugao, Apayao	Pan Pacific Renewable Power Phils., Corp.	600.0
22	Tanudan Hydroelectric Power Project	Barlig, Mountain Province	Asiapac Green Renewable Energy Corp.	2.40
23	Enodey-Abit 1 Hydroelectric Power Project	Bauko, Mountain Province	Kadipo Bauko Hydropower Corp.	2.0
24	Enodey-Abit 2 Hydroelectric Power Project	Bauko, Mountain Province	Kadipo Bauko Hydropower Corp	1.20
25	Enodey-Abit 3 Hydroelectric Power Project	Bauko, Mountain Province	Kadipo Bauko Hydropower Corp	2.0
26	Mabungao Hydroelectric Power Project	Mabungao, Mountain Province	Southeast Asia Renewable Power Corp.	5.70
27	Malecom Hydroelectric Power Project	Malecom, Mountain Province	Southeast Asia Renewable Power Corp.	1.50
28	Malig Hydroelectric Power Project	Malig, Mountain Province	Southeast Asia Renewable Power Corp.	0.80
29	Lower Siffu Hydroelectric Power Project	Natonin, Mountain Province	Asiapac Green Renewable Energy Corp.	8.0

No.	Project Name	Location	Company Name	Installed Capacity (MW)
30	Upper Siffu Hydroelectric Power Project	Natonin, Mountain Province	Asiapac Green Renewable Energy Corp.	8.0
31	Pantor Hydroelectric Power Project	Natonin, Mountain Province	Southeast Asia Renewable Power Corp.	1.20
32	Dicapan Hydroelectric Power Project	Tadian, Mountain Province	Asiapac Green Renewable Energy Corp.	3.0
33	Alilem Hydroelectric Power Project	Alilem, Ilocos Sur	Sta. Clara Power Corporation	4.50
34	Quirino Hydroelectric Power Project	Quirino, Ilocos Sur	Sta. Clara Power Corporation	10.0
35	Danac Hydroelectric Power Project	Sugpon, Ilocos Sur	Sta. Clara Power Corporation	3.0
36	Tubao Hydroelectric Power Project	Tubao, La Union	LGU of Tubao	10.0
37	Baua 1 Hydroelectric Power Plant	Gonzaga, Cagayan	Pan Pacific Renewable Power Phils. Corp.	4.44
38	Dibuluan Hydroelectric Power Project	San Agustin, Isabela	GreenPower Resources Corporation	5.50
39	Ilaguen 2 Hydroelectric Power Project	Dinapigue, Isabela	Isabela Power Corporation	14.0
40	Ilaguen 3 Hydroelectric Power Project	Echague, Isabela	Isabela Power Corporation	11.0
41	Ilaguen 4 Hydroelectric Power Project	Echague, Isabela	Isabela Power Corporation	10.0
42	Dabubu Hydroelectric Power Project	San Agustin / Madella, Isabela / Quirino	GreenPower Resources Corporation	4.50
43	Disabungan Hydroelectric Power Project	San Mariano, Isabela	GreenPower Resources Corporation	5.50
44	Catalangan 1	San Mariano, Isabela	Enerhighlands Corporation	5.50
45	Catalangan 2	San Mariano, Isabela	Enerhighlands Corporation	2.70
46	Ilaguen Hydroelectric Power Project	San Mariano & San Guillermo, Isabela	Isabela Power Corporation	25.0
47	Mangayngay	Alfonso Castañeda, Nueva Vizcaya	United Hydro Power Corporation	1.6
48	Matuno 1 Hydroelectric Power Project	Ambaguio,Nueva Vizcaya	Smith Bell Mini-Hydro Corporation	6.0
49	Matuno 2 Hydroelectric Power Project	Bambang,Nueva Vizcaya	Smith Bell Mini-Hydro Corporation	9.0
50	Diduyon Hydroelectric Power Project	Cabbaroguis ang Dingasan, Quirino	Green Energy Management Holdings	320.0
51	Cabarvan Hydroelectric Power Project	Madella, Quirino	First Pacific Renewable Energy Corporation	1.50
52	Conwap Hydroelectric Power Project	Nagtipunan, Quirino	First Pacific Renewable Energy Corporation	1.60
53	Manglad Hydroelectric Power Project	Nagtipunan, Quirino	First Pacific Renewable Energy Corporation	2.80
54	Davildavilan Hydroelectric Power Project	Dingalan, Aurora	Sunwest Water & Electric Company, Inc.	1.0
55	Balintingon Hydroelectric Power Project	General Tiño, Nueva Ecija	First Gen Luzon Power Corporation	30.0
56	Pantabangan (Pump Storage) Hydroelectric Power Project	Pantabangan, Nueva Ecija	First Gen Prime Energy Corporation	300.0
57	Angat (Pump Storage) Hydroelectric Power Project	Norzagaray, Bulacan	First Gen Primier Energy Corp.	300.0
58	Mariveles Hydroelectric Power Project	Mariveles, Bataan	Southeast Asia Renewable Power Corp.	1.10
59	Siniloan Hydroelectric Power Project	Pangil / Real & Mauban, Laguna / Quezon	Sierra Madre Water Corp.	35.0

No.	Project Name	Location	Company Name	Installed Capacity (MW)
60	Maapon Hydroelectric Power Project	Lucban, Quezon	Renesons Energy Corporation	3.30
61	Nangka 1 River	Antipolo, Rizal	Hydrotec Renewables, Inc.	1.85
62	Hinulugang Taktak	Antipolo, Rizal	Hydrotec Renewables, Inc.	2.24
63	Marikina Upper 2 River	Rodriguez, Rizal	Hydrotec Renewables, Inc.	6.87
64	Marikina 1 River	Rodriguez, Rizal	Hydrotec Renewables, Inc.	1.89
65	Montalban 2 River	Rodriguez, Rizal	Hydrotec Renewables, Inc.	1.85
66	Marikina 3 River	San Mateo, Rizal	Hydrotec Renewables, Inc.	2.46
67	Nangka 4 River	Marikina, Metro Manila	Hydrotec Renewables, Inc.	1.08
68	Dulangan Hydroelectric Power Project	Baco, Oriental Mindoro	PNOC – Renewables Corp.	18.0
69	Linao-Cawayan (Upper Cascade) Hydroelectric Power Plant	Baco, Oriental Mindoro	Oriental Mindoro Electric Coop., Inc.	2.10
70	Bongabong Hydroelectric Power Project	Bongabong, Oriental Mindoro	Constellation Energy Corporation	10.0
71	Catuiran (Upper Cascade) Hydroelectric Power Project	Naujan, Oriental Mindoro	PhilNew Hydro Power Corporation	8.0
72	Catuiran Hydroelectric Power Project	Naujan, Oriental Mindoro	Sta. Clara Power Corporation	8.0
73	Alag Hydroelectric Power Project	San Teodoro, Oriental Mindoro	Constellation Energy Corporation	20.0
74	Inabasan Hydroelectric Power Project	San Teodoro, Oriental Mindoro	Ormin Power, Inc.	10.0
75	Linao-Cawayan Phase 1 (tail-end)	San Teodoro, Oriental Mindoro	Mindoro Grid Corporation	1.30
76	Linao-Cawayan Phase 1 (tail-end)	San Teodoro, Oriental Mindoro	Mindoro Grid Corporation	1.0
77	Batang-Batang Hydroelectric Power Project	Narra, Palawan	Langogan Power Corporation	3.5
78	Langogan Hydroelectric Power Project	Puerto Princesa	Langogan Power Corporation	6.80
79	Palali Falls Hydroelectric Power Project	Malinao, Albay	Sunwest Water & Electric Company, Inc.	0.20
80	Barit (Irrigation Discharge) Hydroelectric Power Project	Buhi, Camarines Sur	NASCENT Technologies Corp.	0.40
81	Kapipian Hydroelectric Power Project	San Miguel, Catanduanes	Sunwest Water & Electric Company, Inc.	2.40
82	Marikina 4 River	San Mateo, Rizal	Hydrotec Renewables, Inc.	2.59
	VISAYAS			**80.50**
83	Aklan River Lower East Tributary	Libacao, Aklan	Sunwest Water & Electric Company, Inc.	3.0
84	Aklan River Middle West Tributary	Libacao, Aklan	Sunwest Water & Electric Company, Inc.	2.40
85	Aklan River Upper West Tributary	Libacao, Aklan	Sunwest Water & Electric Company, Inc.	2.40
86	Caro-an Hydroelectric Power Project	Sebaste, Antique	Antique Electric Cooperative, Inc.	1.0
87	Ipayo Hydroelectric Power Project	Sebaste, Antique	Antique Electric Cooperative, Inc.	1.30
88	Lower Himogaan Hydroelectric Power Project	Sagay,Negros Occidental	LGU of Sagay	4.0
89	Cantakoy Hydroelectric Power Project	Danao, Bohol	QuadRiver Energy Corporation	8.0

No.	Project Name	Location	Company Name	Installed Capacity (MW)
90	Pacuan – Ginobaan Hydroelectric Power Project	La Libertad, Negros Oriental	PNOC Renewables Corporation	33.0
91	Siaton Hydroelectric Power Project	Siaton, Negros Oriental	PNOC Renewables Corporation	5.40
92	Okoy Hydroelectric Power Project	Valencia, Negros Oriental	PNOC Renewables Corporation	11.0
93	Maslog 1 Hydroelectric Power Project	Maslog, Eastern Samar	Maslog 1 Hydro Corporation	9.0
	MINDANAO			**271.84**
94	Pasonanca (Upstream) Hydroelectric Power Project	Zamboanga City	PhilCarbon Inc.	1.0
95	Pasonanca Hydroelectric Power Project	Zamboanga City	PhilCarbon Inc.	0.5
96	Polandoc Hydroelectric Power Project	Leon Postigo, Zamboanga del Norte	Euro Hydro Power (Asia) Holdings, Inc.	2.0
97	Malitbog Hydroelectric Power Project	Malitbog, Bukidnon	Sta. Clara Corporation	5.0
98	Silo-o Hydroelectric Power Project	Malitbog, Bukidnon	Sta. Clara Corporation	4.50
99	Mangima Hydroelectric Power Project	Manolo Fortich, Bukidnon	Sta. Clara Corporation	10.0
100	Maramag Hydroelectric Power Project	Maramag, Bukidnon	First Bukidnon Electric Cooperative, Inc.	2.0
101	Muleta Hydroelectric Power Project	Maramag, Bukidnon	First Bukidnon Electric Cooperative, Inc.	2.0
102	Upper Manupali Hydroelectric Power Project	Valencia, Bukidnon	Bukidnon II Electric Cooperative Inc.	2.0
103	Langaran Hydroelectric Power Project	Calamba, Misamis Occidental	Misamis Occidental 1 Electric Cooperative Inc.	3.64
104	Palilan Hydroelectric Power Project	Jimenez, Misamis Occidental	Misamis Occidental II Electric Coop.	1.1
105	Mat-i 2 Hydroelectric Power Project	Cagayan de Oro	Sta. Clara Corporation	4.0
106	Mat-i 3 Hydroelectric Power Project	Cagayan de Oro	Sta. Clara Corporation	4.0
107	Simod Hydroelectric Power Project	Davao City	Hedcor Bukidnon, Inc.	11.80
108	Sita Hydroelectric Power Project	Davao City	Hedcor Bukidnon, Inc.	16.40
109	Malita Hydroelectric Power Project	Malita, Davao del Sur	LGU of Malita	2.50
110	Tudaya 1 Hydroelectric Power Project	Sta. Cruz, Davao del Sur	Hedcor Sibulan, Inc.	6.6
111	New Bataan Hydroelectric Power Project	New Bataan, Compostela Valley	Euro Hydro Power (Asia) Holdings, Inc.	1.0
112	Alamada Hydroelectric Power Project	Alamada, North Cotabato	Euro Hydro Power (Asia) Holdings, Inc.	1.0
113	Malitubog Hydroelectric Power Project	Alamada, North Cotabato	Euro Hydro Power (Asia) Holdings, Inc.	3.0
114	Kabulnan 2 Hydroelectric Power Project	Isulan, Sultan Kudarat	Sta. Clara Power Corporation	110.0
115	Siguil 1 Hydroelectric Power Project	Maasim, Sarangani	Alsons Energy Development Corporation	8.70
116	Siguil 2 Hydroelectric Power Project	Maasim, Sarangani	Alsons Energy Development Corporation	3.20

No.	Project Name	Location	Company Name	Installed Capacity (MW)
117	Siguil 3 Hydroelectric Power Project	Maasim, Sarangani	Alsons Energy Development Corporation	4.80
118	Taguibo 1 Hydroelectric Power Project	Butuan, Agusan del Norte	Equi-Parco Construction Co.	2.0
119	Taguibo 2 Hydroelectric Power Project	Butuan, Agusan del Norte	Equi-Parco Construction Co.	2.0
120	Lake Mainit	Jabonga, Agusan del Norte	Agusan Power Corporation	25.0
121	Asiga Hydroelectric Power Project	Santiago, Agusan del Norte	Equi-Parco Construction Co.	5.0
122	Carac-an	Madrid, Surigao del Sur	Hydro Link Projects Corporation	25.0
123	Kapai Hydroelectric Power Project	Kapai, Lanao del Sur	Euro Hydro Power (Asia) Holdings, Inc.	0.10
124	Bayug Hydroelectric Power Project	Iligan City	Euro Hydro Power (Asia) Holdings, Inc.	1.0
125	Titunod Hydroelectric Power Project	Kolambogan, Lanoa del Norte	Euro Hydro Power (Asia) Holdings, Inc.	1.0
	Total			**2,479.33**

Ocean

TABLE 24. AWARDED OCEAN POWER PROJECTS (AS OF OCTOBER 31, 2013)

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**5.0**
1	Cagangan Ocean Thermal Energy Conversion (OTEC)	Cagangan, Zambales	Bell Pririe Power Corporation	5.0
2	Sablayan Ocean Thermal Energy Conversion (OTEC)	Sablayan, Mindoro	Deep Ocean Power Philippines, Inc. (DOPPI)	TBD
	VISAYAS			**TBD**
3	Antique Ocean Power Project	Anini-y, Antique	Deep Ocean Power Philippines, Inc. (DOPPI)	TBD
	Total			**5.0**

Wind

The country is situated on the fringes of the Asia Pacific monsoonal belt and exhibits a good potential for wind energy. Based on the Philippine Wind Energy Resource Atlas prepared by the US National Renewable Energy Laboratory in 2001, the country has 76,600 MW total wind potential in six (6) regions, namely: (1) the Batanes and Babuyan islands north of Luzon (2) the northwest tip of Luzon (Ilocos Norte); (3) the higher interior terrain of Luzon, Mindoro, Samar, Leyte, Panay, Negros, Cebu, Palawan, eastern Mindanao, and adjacent islands; (4) well-exposed east-facing coastal locations from northern Luzon southward to Samar, (5) the wind corridors between Luzon and Mindoro (including Lubang Island); and (6) between Mindoro and Panay (including the Semirara Islands and extending to the Cuyo Islands).

The 25 MW wind farm, which is the first and only wind project in the country, was installed by North Wind Power Development Corporation in Bangui, Ilocos Norte on 2005 and expanded to 33 MW on 2008.

To remain as the leading wind energy producer in Southeast Asia, DOE aims to have a 2,345 MW capacity addition into the existing installed capacity of 33 MW. As of October 31, 2013, 38 wind energy service contracts have been awarded and are listed in Table 25.

TABLE 25. AWARDED WIND PROJECTS (AS OF 31 OCTOBER 2013)

A. INSTALLED CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**33.0**
1	Bangui Wind Power Project (Phase 1 and Phase 2 Conversion from NCC to WESC)	Burgos – Bangui, Ilocos Norte	North Wind Power Development Corporation	33.0
	Total			**33.0**

B. DEVELOPMENT CONTRACT

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**235.5**
1	Burgos Wind Power Project	Saoit - Nagsurot - Burgos, Ilocos Norte	EDC Burgos wind Power Corporation	87.0
2	Caparispisan Wind Power Project	Pagudpud, Ilocos Norte	Northern Luzon UPC Asia Corporation	81.0
3	Pililla Wind Power Project	Pililla, Rizal & Mabitac, Laguna	Alternergy Wind One Corporation	67.50
	VISAYAS			**154.0**
4	Nabas Wind Power Project	Nabas - Buruanga - Malay, Aklan	PetroGreen Energy Corporation	50.0
5	San Lorenzo Wind Power Project	San Lorenzo, Guimaras	Trans-Asia Renewable Energy Corporation	54.0
6	Pulupandan Wind Power Project	Pulupandan, Negros Occidental	FirstMaxpower International Corporation	50.0
	Total			**389.50**

C. WITH DECLARATION OF COMMERCIALITY

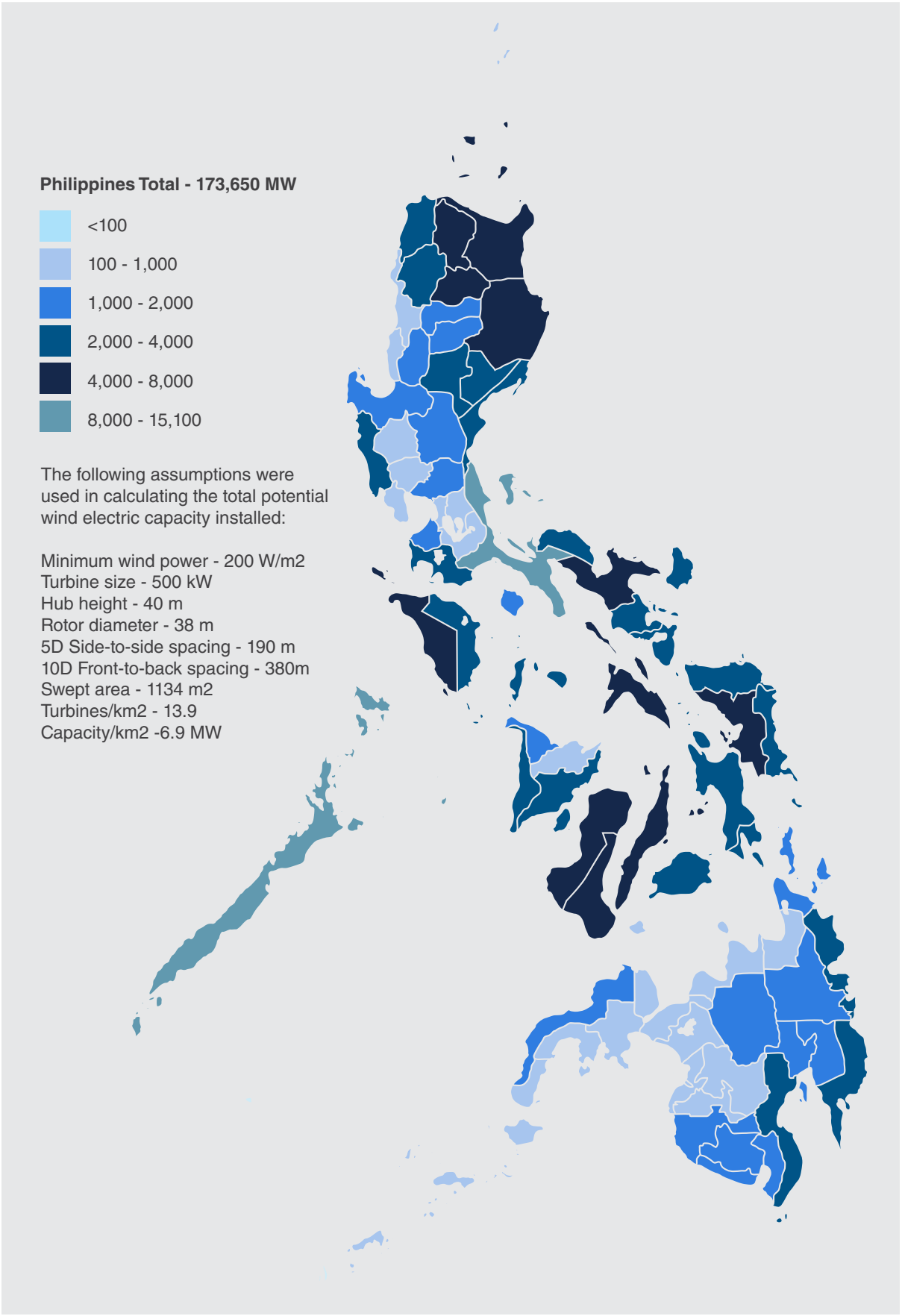
No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**195.0**
1	Pagudpud Wind Power Project	Pagudpud, Ilocos Norte	Energy Development Corporation	84.0
2	Baloi Wind Power Project	Pagudpud, Ilocos Norte	Northern Luzon UPC Asia	45.0
3	Pasuquin East Wind Power Project	Burgos - Pasuquin, ilocos Norte	Energy Logics Philippines, Inc.	48.0
4	Bangui Bay Wind Power Project (Phase 3)	Burgos, Bangui, Ilocos Norte	Northwind Power Development Corporation	18.0
	Total			**195.0**

D. PRE-DEVELOPMENT STAGE

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**2.10**
1	Sagada Wind Power Project	Besao - Sagada, Mountain Province	Sagada - Besao Wind Power Corporation	TBD
2	North Pasuquin Wind Power Project	Pasuquin - Burgos, Ilocos Norte	Energy Logics Philippines, Inc.	100.0
3	Burgos 2 Wind Power Project	Burgos, Ilocos Norte	First Gen Renewables Incorporated	TBD
4	Claveria Wind Power Project	Claveria, Cagayan	FirstMaxpower International Corporation	15.0
5	Sanchez Mira Wind Power Project	Sanchez Mira, Cagayan	FirstMaxpower International Corporation	50.0
6	Abulug - Ballesteros - Aparri Wind Power Project	Abulug - Ballesteros - Aparri, Cagayan	Trans-Asia Renewable Energy Corporation	45.0
7	Aparri - Camalaniugan - Buguey Wind Power Project	Aparri - Camalaniugan - Buguey, Cagayan	Trans-Asia Renewable Energy Corporation	48.0
8	Aparri - Buguey Wind Power Project	Aparri - Buguey, Cagayan	NorthPoint Wind Power Development Corporation	40.0
9	Redondo Wind Power Project	San Antonio - Subic, Zambales	Pan Energy Corporation	TBD

No.	Project Name	Location	Company Name	Installed Capacity (MW)
10	Mt. Redondo Wind Power Project	Subic - San Antonio, Zambales	Energy Logics Philippines, Incorporated	112.0
11	Cavinti Wind Power Project	Cavinti	Alternergy Philippine Holdings Corporation	50.0
12	Calauag Wind Power Project	Calauag, Quezon	Trans-Asia Renewable Energy Corporation	10.0
13	Infanta Wind Power Project	Infanta, Quezon	Trans-Asia Renewable Energy Corporation	10.0
14	Bulalacao Wind Power Project	Bulalacao, Oriental Mindoro	PhilCarbon, Inc.	TBD
15	Puerto Galera Wind Power Project	Abra de Ilog and Puerto Galera, Occidental & Oriental Mindoro	Philippine Hybrid Energy Systems, Inc.	16.0
16	Abra de Ilog Wind Power Project	Abra de Ilog and Puerto Galera, Occidental & Oriental Mindoro	Alternergy Philippine Holdings Corporation	40.0
17	Paracale - Vinzons Wind Power Project	Paracale - Vinzons, Camarines Norte	Trans-Asia Renewable Energy Corporation	26.0
18	Mercedes Wind Power Project 1	Vinzons - Talisay - Daet - Mercedes, Camarines Norte	Coastal Power Development Corporation	100.0
19	Mercedes and Daet Wind Power Project	Mercedes & Daet, Camarines Norte	First Gen Renewables Incorporated	TBD
20	Prieto Diaz Wind Power Project	Prieto Diaz - Gubat, Sorsogon	Coastal Power Development Corporation	420.0
21	Bernacci Mountain Wind Power Project	Libmanan, Camarines Sur	Cornerstone Energy Development, Inc.	70.0
	VISAYAS			**38.0**
22	Nabas - Malay Wind Power Project	Nabas - Malay, Aklan	Tri-Conti Elements Corporation	TBD
23	Nueva Valencia Wind Power Project	Nueva Valencia, Guimaras	Trans-Asia Renewable Energy Corporation	10.0
24	Sibunag Wind Power Project	Sibunag, Guimaras	Trans-Asia Renewable Energy Corporation	16.0
25	Dumangas Wind Power Project	Dumangas, Iloilo	Trans-Asia Renewable Energy Corporation	12.0
26	Tanjay Wind Power Project	Bayawan - Tanjay / Bais - Pamplona, Negros Oriental	Constellation Energy Corporation	TBD
27	Cebu City Wind Power Project	Minglanilla and Talisay and City of Cebu	Amihan Energy Corporation	TBD
	Total			**1,190.0**

FIGURE 12. PHILIPPINE WIND ELECTRIC POTENTIAL



Biomass

The country has a total installed capacity of 119 MW. In addition, 30 Biomass Renewable Energy Operating Contract (BREOC). Table 26 provides the list of contracts awarded as of October 31, 2013.

TABLE 26. AWARDED BIOMASS PROJECTS WITH BREOC (AS OF 31 OCTOBER 2013)

A. INSTALLED CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**55.35**
1	7.2 MW Rice Hull Gasification (Phase 1)	Alicia, Isabela	Lucky PPH International, Inc.	3.6
2	19 MW Bagasse-fired Cogeneration Power Plant	San Mariano, Isabela	Green Future Innovations Inc.	19.0
3	12.5 MW Bataan 2020 Rice Hull-fired Cogen Plant	Samal, Bataan	Bataan 2020 Inc.	12.5
4	Excel Farm Methane Recovery and Electricity Generation Project	San Ildefonso, Bulacan	Solutions Using Renewable Energy Inc.	0.2
5	0.9 MW RF#12 Biogas Power Generation System	San Miguel, Bulacan	Hacienda Bio-energy Inc.	0.9
6	Amigo Farm Methane Recovery and Electricity Generation Project	Sta. Maria, Bulacan	Solutions Using Renewable Energy Inc.	0.15
7	4 MW San Pedro Landfill Methane Recovery and Electricity Generation	San Pedro, Laguna	Bacavalley Energy Inc.	4.0
8	14.8 MW Montalban Landfill Methane Recovery and Electricity Generation	Rodriguez, Rizal	Montalban Methane Power Corporation	14.8
9	1.2 MW Payatas Landfill Methane Recovery and Power Generation Facility	Quezon City	Pangea Green Energy Philippines, Inc.	0.2
	VISAYAS			**70.0**
10	15 MW CASA Bagasse-Fired Cogeneration Facility	Passi City	Central Azucarera de San Antonio	15.0
11	8 MW SCBI Multi-Feedstock Cogeneration Plant	Silay City	San Carlos Bioenergy, Inc.	8.0
12	8 MW HPCo Bagasse Cogeneration Plant	Silay City	Hawaiian Philippines Co.	8.0
13	21 MW FFHC Bagasse Cogeneration System	Talisay City	First Farmers Holding Corp.	21.0
14	26 MW VMCI Bagasse-Fired Plant	Victorias City	Victorias Milling Company Inc.	18.0
	MINDANAO			**21.0**
15	21 MW CSCI Bagasse-Fired Cogeneration Facility	Maramag, Bukidnon	Crystal sugar Company, Inc.	21.0
	Total			**147.35**

B. AWARDED WITH CERTIFICATE OF COMMERCIALITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**12.0**
1	9.9 MWe (net) SCJiPower Rice Husk-fired Biomass Power Plant Project	San Jose City	San Jose City I Power Corporation	11.0
2	1.2 MW Payatas Landfill Methane Recovery and Power Generation Facility	Quezon City	Pangea Green Energy Philippines, Inc.	1.0
	Total			**12.0**

C. WITH DECLARATION OF COMMERCIALITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**12.0**
1	20 MW Biomass Power Plant	Alicia, Isabela	Isabela Biomass Energy Corporation	20.0
	VISAYAS			**18.0**
2	18 MW SCBiopower Bagasse-fired Power Generation Project	San Carlos City, Negros Occidental	San Carlos Biopower Inc.	18.0
	Total			**30.0**

D. POTENTIAL CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**27.60**
1	1 MW Biomass Energy Project for Pepsi Rosario, La Union	Rosario, La Union	Sure PEP, Inc.	1.0
2	7.2 MW Rice Hull Gasification (Phase 2)	Alicia, Isabela	Lucky PPH International, Inc.	3.6
3	1 MW Bocaue biogas to Electricity Facility	Bocaue, Bulacan	Sage Equipment and Consulting Group, Inc.	1.0
4	500 kW Ecomarket Solutions Woody Biomass Power Plant	Dinalungan, Aurora	EcoMarketSolutions, Inc.	0.50
5	1.5 MW Ecomarket Solutions Woody Biomass Power Plant	Dilasag, Aurora	EcoMarketSolutions, Inc.	1.5
6	Refuse-Derived Fuel (RDF) Processing Plant	Rodriguez, Rizal	Green Alternative Technology Specialist, Inc.	
7	20 MW Waste-to-Energy Project using Thermal Gasifier Conversion	Naga, Camarines Sur	CJ Global Green Energy Philippines Corp.	20.0
	VISAYAS			**4.0**
8	Consolacion Landfill Methane Recovery and Electricity Generation	Consolacion, Cebu	Asian Energysystems Corporation	4.0
	MINDANAO			**30.0**
9	10 MW Kalilangan Bio-Energy Corporation MultiFeedstock Power Generating Facility	Kalilangan, Bukidnon	Kalilangan Bio-Energy Corporation	10.0
10	10 MW Malaybalay Bio-Energy Corporation MultiFeedstock Power Generating Facility	Malaybalay, Bukidnon	Malaybalay Bio-Energy Corporation	10.0
11	10 MW Don Carlos Bio-Energy Corporation MultiFeedstock Power Generating Facility	Don Carlos, Bukidnon	Don Carlos Bio-Energy Corporation	10.0
	Total			**147.35**

Solar

The Philippines offers a vast potential for solar energy applications both in on-grid and off-grid areas. An NREL study revealed that the country has an annual potential average of 5.1 kilowatt-hour (kWh)/m2/day. Currently, the country has its first on-grid one (1) MW photovoltaic plant in Cagayan de Oro City that is connected to the distribution network of the Cagayan Electric Power & Light Company, (CEPALCO) Incorporated. The plant uses 6,500 polycrystalline silicon solar panels spreading on a 2-hectare area.

As of October 31, 2013, 34 solar service contracts have been awarded as listed in Table 27.

TABLE 27. AWARDED SOLAR PROJECTS (AS OF 31 OCTOBER 2013)

A. DEVELOPMENT CONTRACT

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**50.0**
1	Currimao Solar Power Project	Currimao, Ilocos Norte	Mirae Asia Energy Corp.	20.0
2	Rodriguez Solar Power Project	Rodriguez, Rizal	ATN Philippines Solar Energy Group, Inc.	30.0
	VISAYAS			**30.0**
3	Leyte Solar Power Project	Ormoc, Leyte	Philippine Solar Farm - Leyte, Inc.	30.0
	Total			**80.0**

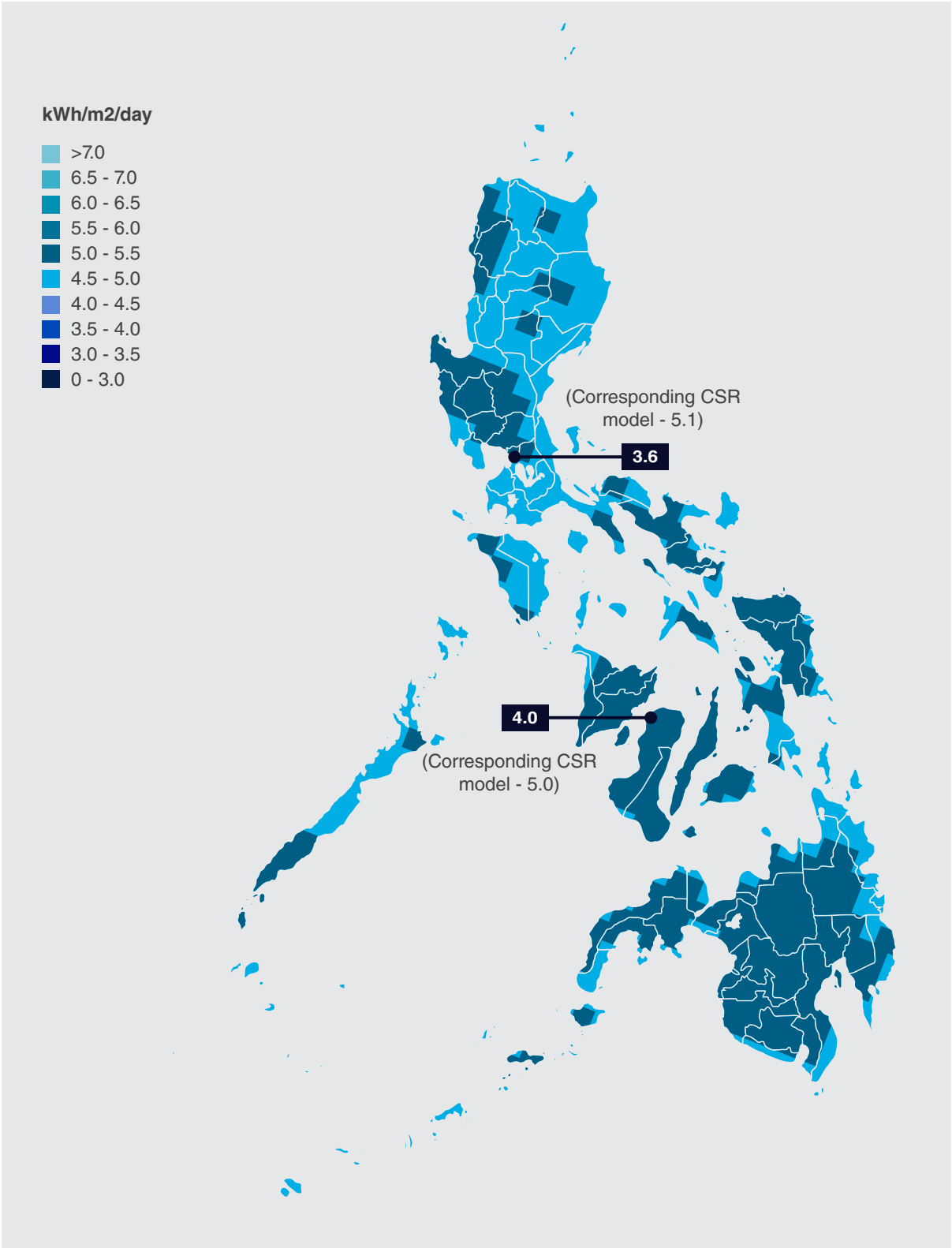
B. WITH DECLARATION OF COMMERCIALITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**40.0**
1	Clark Freeport Zone Solar Power Project	Mabalacat – Angeles, Pampanga	Enfinity Philippines Renewable Resources Inc.	10.0
2	Morong Solar Power Project	Morong, Bataan	SPARC Solar Powered Agri-Rural Communities Corp.	5.0
3	San Rafael Solar Power Project	San Rafael, Bulacan	SPARC Solar Powered Agri-Rural Communities Corp.	5.0
4	Palauig Solar Power Project	Palauig, Zambales	SPARC Solar Powered Agri-Rural Communities Corp.	5.0
5	Mexico Solar Power Project	Mexico, Pampanga	SPARC Solar Powered Agri-Rural Communities Corp.	5.0
6	Cavite Export Zone Solar Power Project	Noveleta – Rosario – Gen. Trias – Tanza, Cavite	Enfinity Philippines Renewable Resources Inc.	10.0
	MINDANAO			**45.0**
7	Digos Solar Power Project	Digos, Davao del Sur	Enfinity Philippines Renewable Resources Inc.	10.0
8	Darong Solar Power Project	Sta. Cruz, Davao del Sur	PhilNewEnergy, Inc.	35.0
	Total			**85.0**

C. POTENTIAL CAPACITY

No.	Project Name	Location	Company Name	Installed Capacity (MW)
	LUZON			**195.706**
1	Pasuquin – Burgos Solar Power Project	Pasuquin - Burgos, Ilocos Norte	Energy Logics Philippines, Inc.	50.0
2	Aparri Solar Power Project	Aparri, Cagayan	GreEnergy Power Systems Philippines, Inc.	105.0
3	Casiguran Solar Power Project	Casiguran, Aurora	Aurora Special Economic Zone Authority	1.0
4	Casiguran Solar Power Project	Casiguran, Aurora	Enfinity Philippines Renewable Resources Inc.	2.0
5	Hermosa Ecozone Industrial Park Solar Power Project	Hermosa, Bataan	Sunterra Energy, Inc.	10.0
6	Pantabangan Dam Solar Power Project	Pantabangan, Nueva Ecija	First Philec Solar Solutions Corporation	3.5
7	Cabanatuan City Solar Power Project	Cabanatuan City, Nueva Ecija	First Cabanatuan Ventures, Inc.	TBD
8	Naic Solar Power Project	Naic -Tanza, Cavite	Naicsolar Inc.	10.0
9	Canlubang Solar Power Project	Calamba, Laguna	Transnational Renewable Energy Corporation	0.206
10	Lima Technology Center, Lipa City Solar Power Project	Lipa City, Batangas	Limasolar, Inc.	10.0
11	Polilio Solar Power Project	Burdeos, Quezon	Enfinity Philippines Renewable Resources Inc.	2.0
12	Palawan Solar Power Project	Quezon, Palawan	Enfinity Philippines Renewable Resources Inc.	1.0
13	Sibuyan Solar Power Project	San Fernando, Romblon	Enfinity Philippines Renewable Resources Inc.	1.0
	VISAYAS			**101.0**
14	E.B. Magalona Solar Power Project	E.B. Magalona, Negros Occidental	Youil Renewable Energy Corp.	30.0
15	Negros Occidental Solar Power Project	Cadiz City	Phil-Power Exploration & Development Corp.	50.0
16	Ubay Solar Power Project	Ubay, Bohol	Youil Renewable Energy Corp.	10.0
17	Mactan Economic Zone Solar Power Project	Lapu-lapu City, Cebu	Enfinity Philippines Renewable Resources Inc.	10.0
18	Camotes Solar Power Project	Poro, Cebu	Enfinity Philippines Renewable Resources Inc.	1.0
	MINDANAO			**26.0**
19	Sacol Solar Power Project	Sacol Island, Zamboanga City	Enfinity Philippines Renewable Resources Inc.	1.0
20	Kirahon Solar Power Project	Kirahon, Misamis Oriental	Cagayan Electric Power & Light Company, Inc.	20.0
21	Kalamansig Solar Power Project	Kalamansig, Sultan Kudarat	Enfinity Philippines Renewable Resources Inc.	2.0
22	Dinagat Solar Power Project	Libjo, Surigao del Norte	Enfinity Philippines Renewable Resources Inc.	1.0
23	Tawi-Tawi Solar Power Project	Balimbing, Tawi-Tawi	Enfinity Philippines Renewable Resources Inc.	2.0
	Total			**322.706**

FIGURE 13. CLIMATOLOGICAL SOLAR RADIATION MODEL



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