

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 Table 1, 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

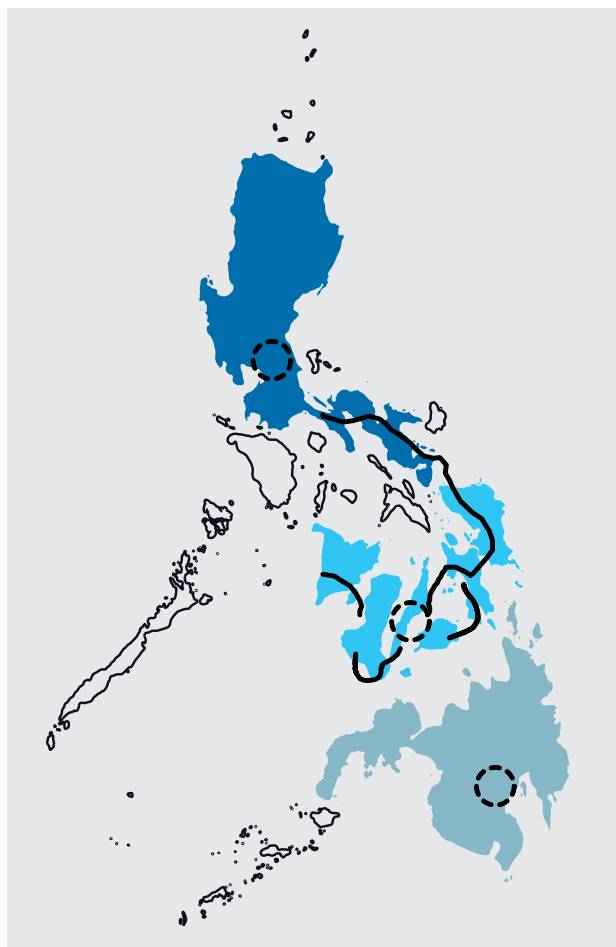
Fuel Type	Philippines			
	Capacity (MW)		Percent Share (%)	
	Installed	Dependable	Installed	Dependable
Coal	5,568	5,206	32.71	34.55
Oil Based	3,074	2,561	18.05	17.00
Natural Gas	2,862	2,760	16.81	18.32
Geothermal	1,848	1,462	10.85	9.70
Hydro	3,521	2,983	20.68	19.80
Wind	33	17	0.19	0.12
Solar	1	0	0.01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

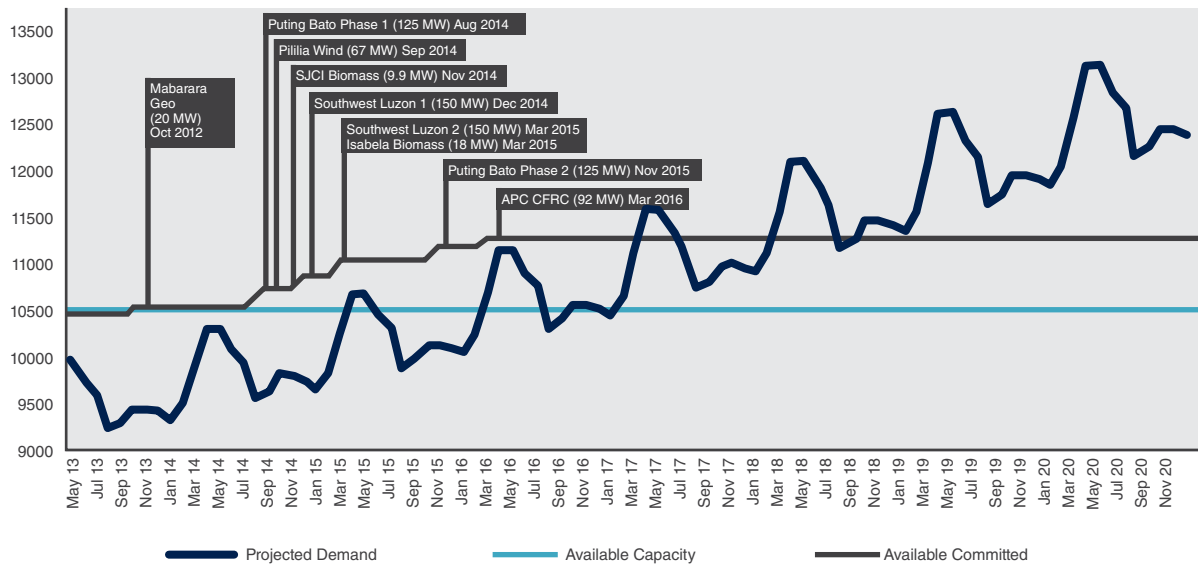
TABLE 2. 2013 INSTALLED CAPACITIES, MW

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:

- 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.
- 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.
- 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.
- 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: Piliia Wind Power Project	Alternergy Wind One Corporation	Brgy. Halayhayin, Piliia, Rizal	67.5	September 2014
9.9 MWe (net) SJICIP 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	

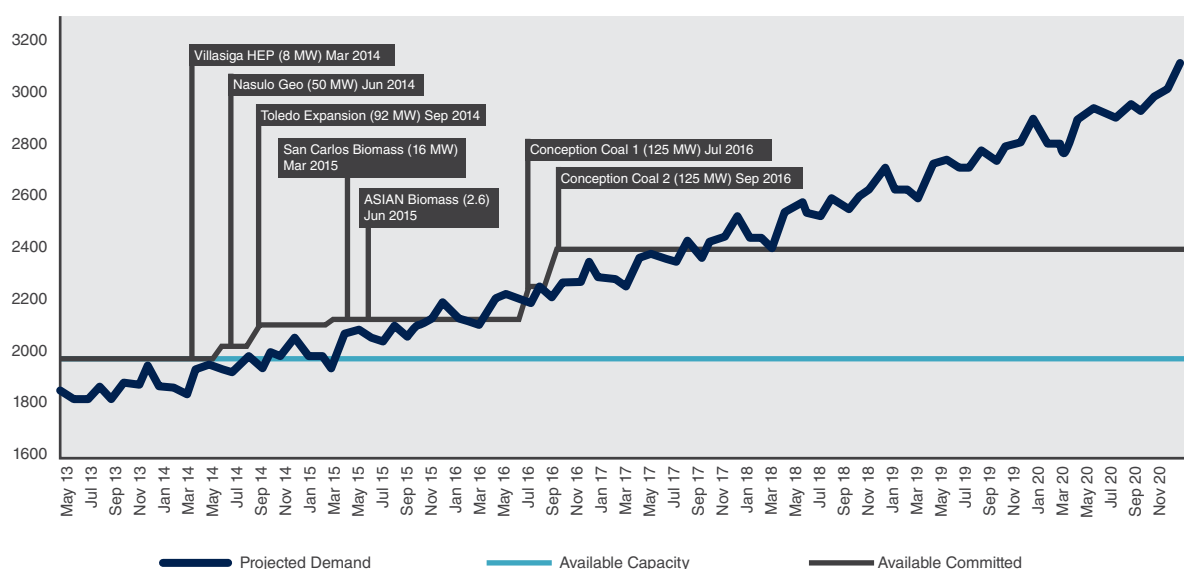
Name of the Project	Project Proponent	Location	Rated Capacity (MW)	Target Year
Aero Derivative Combined Cycle Power Plant	Calamba Aero Power Corporation	Calamba, Laguna	150	TBA
Total Diesel			150	
Pagbilao 300 MW Combined Cycle Gas-Fired Power Plant	Energy World Corporation	Brgy. Ibabang Polo, Grande 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			75	
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. Baloi, 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 other hand, 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:

- 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.
- 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.
- 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.
- 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.

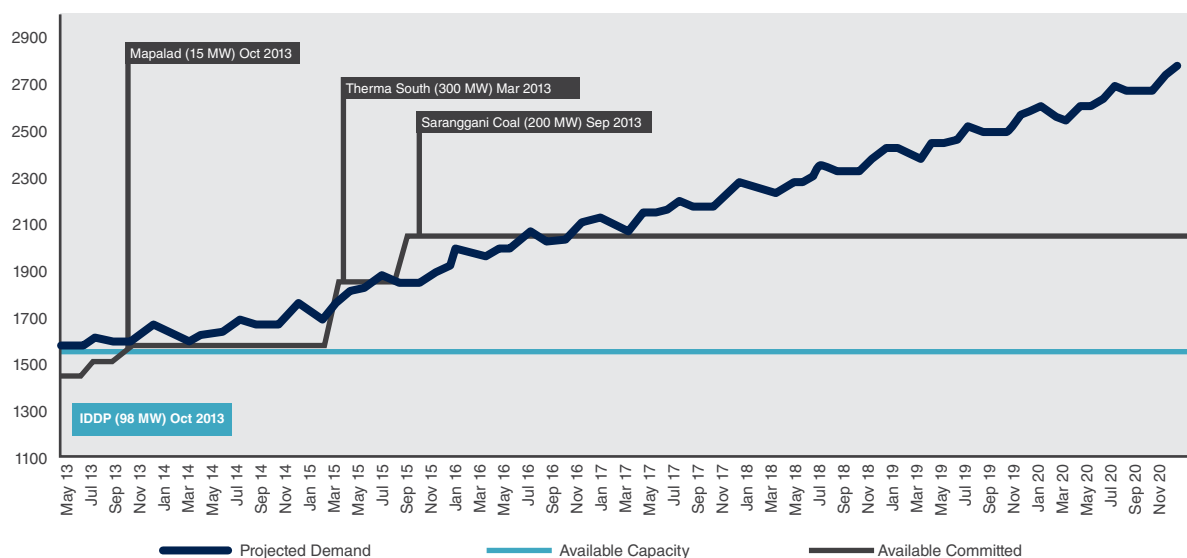
TABLE 4. PRIVATE SECTOR INITIATED POWER PROJECTS IN VISAYAS (AS OF OCTOBER 2013)

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:

- 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.
- 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.
- 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.
- 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.
- 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
Limbatangan 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)

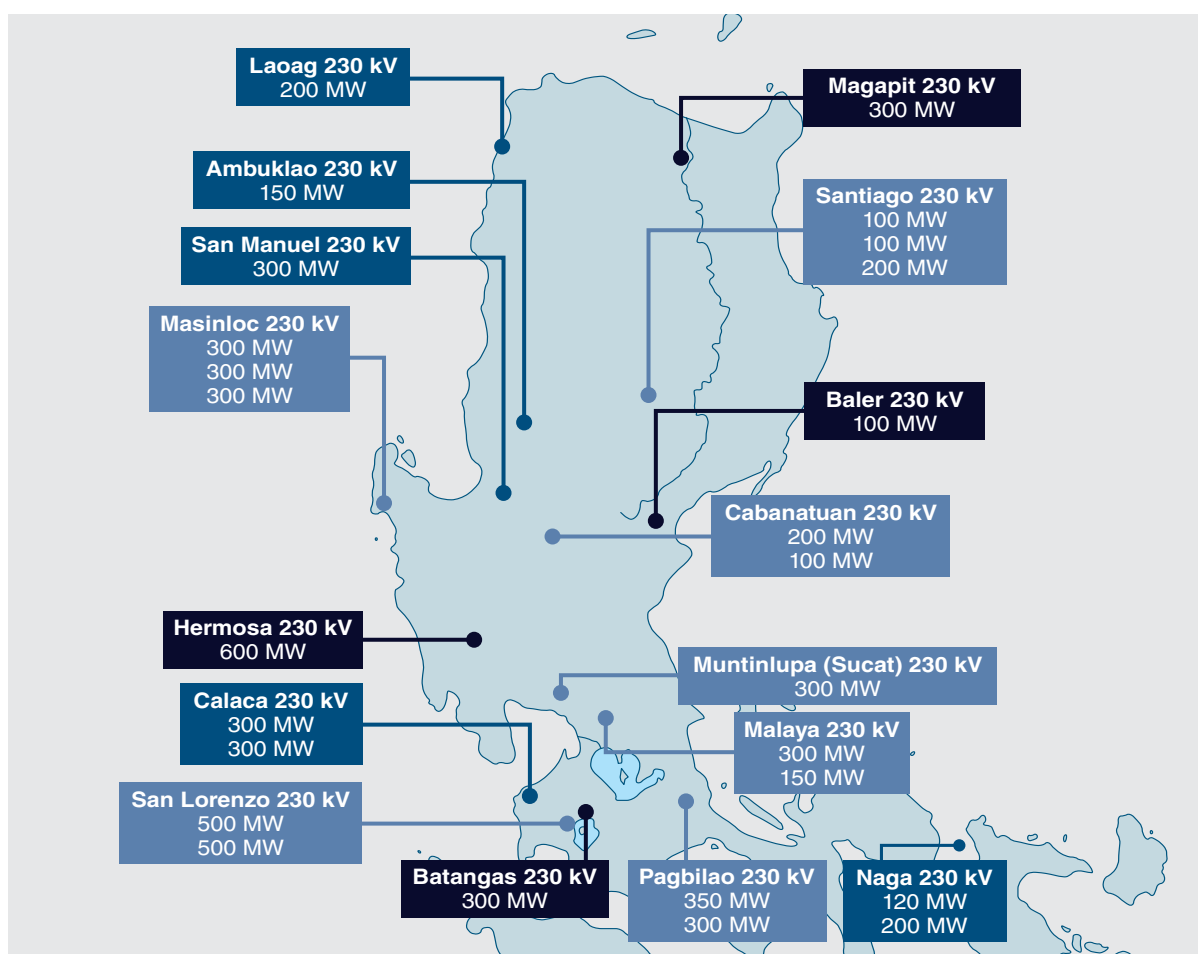


FIGURE 6. IDEAL LOCATION OF NEW POWER PLANTS IN VISAYAS (SOURCE: NGCP)

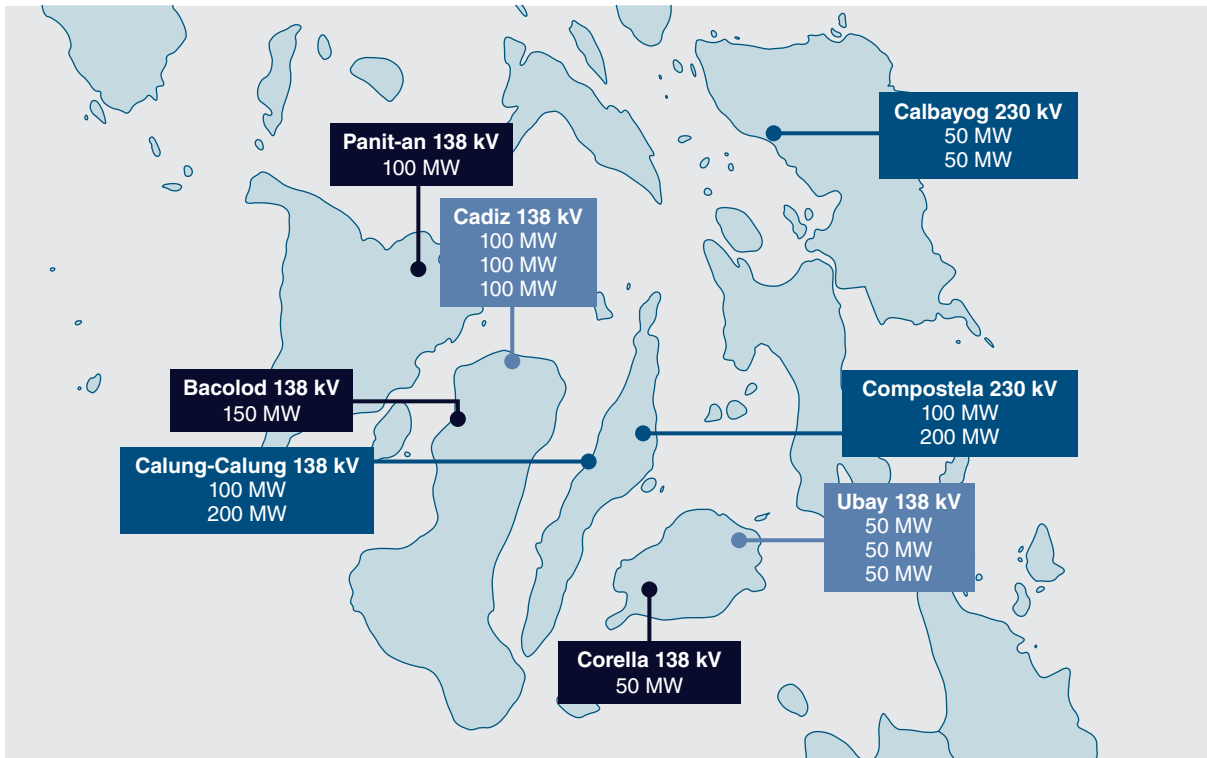


FIGURE 7. IDEAL LOCATION OF NEW POWER PLANTS IN MINDANAO (SOURCE: NGCP)

