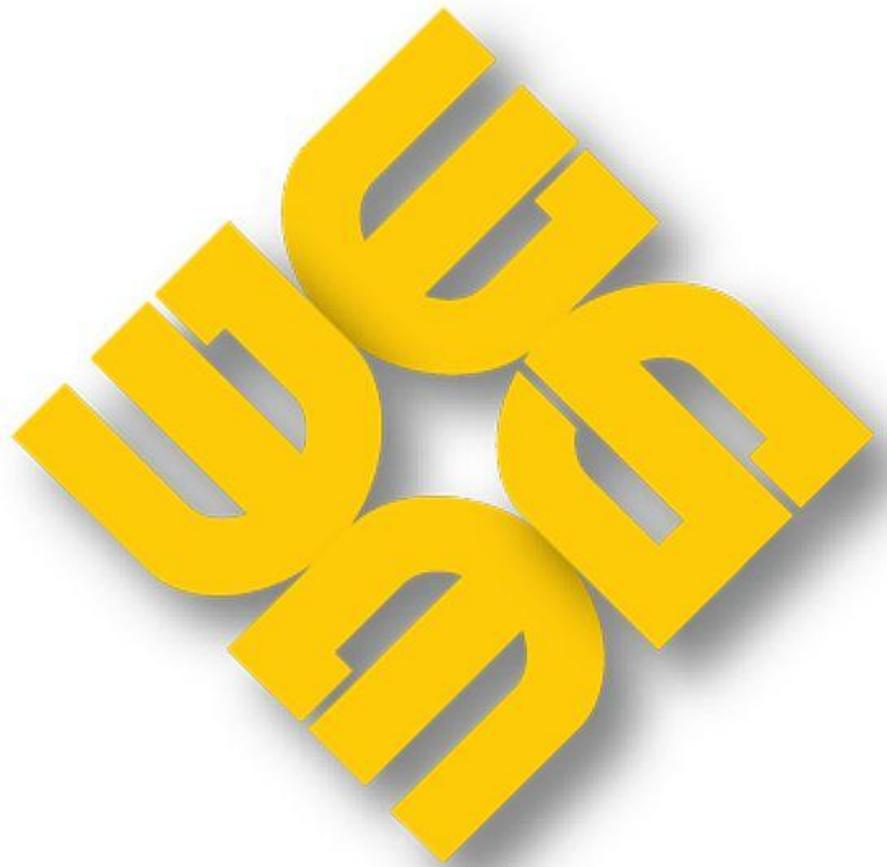


MAG-MMAR-2019-11

MONTHLY MARKET ASSESSMENT REPORT

For the Billing Period 26 October to 25 November 2019



**PHILIPPINE
ELECTRICITY
MARKET
CORPORATION**

**MARKET ASSESSMENT GROUP
(MAG)**

Monthly Market Assessment Report for November 2019 Billing Month

1. Summary

The November billing month was observed to have a narrower supply margin than the last billing month brought about by the higher level of outage capacity of power plants despite the decrease in demand. While declining in trend, the November system demand, averaging at 10,218 MW, is closely comparable to the level of summer month of April, averaging at 10,293 MW. Given this demand and supply condition, the Luzon and Visayas grids experienced a number of yellow alerts as reserve capacities continued to diminish this month. As a consequence of the foregoing events, the resulting market price increased by 21.2 percent from PhP4,219/MWh in October to PhP5,114/MWh this month.

2. Market Outcomes

2.1. Capacity Profile

The WESM registered capacity recorded an increase of 89.3 MW for this month from a total of 19,992.3 MW to 20,081.57 MW. This additional capacity represents more than triple of what was observed in October at 25 MW. The increase came from four newly-registered biomass plants, namely: 25-MW North Negros Biopower, Inc., 23.5-MW Central Azucarera de Bais, Inc., and 30-MW Biscom, Inc., biomass plants in Visayas and 10.8-MW Grassgold Renewable Energy Corporation biomass plant in Luzon. This posted a minimal rise in the share of biomass in the overall capacity mix, staying at the 2 percent level.

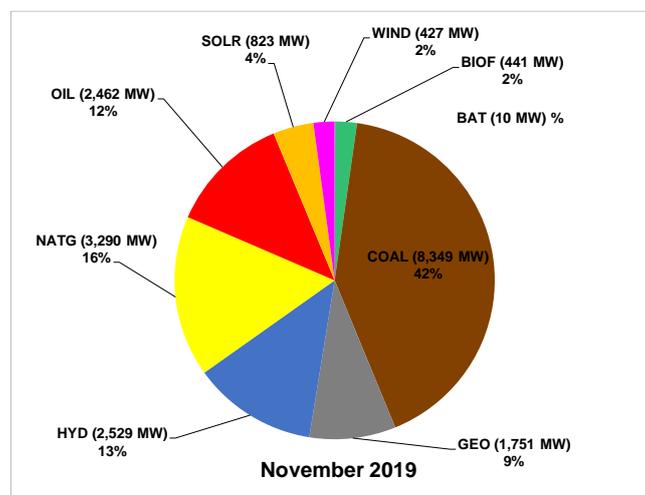


Figure 1. Registered Capacity Mix, November 2019

The build-up of outage capacity from an average of 2,408 MW to 3,071 MW this month adversely affected the level of the total offered capacity resulting to a decline from last month's average of 13,538 MW to 12,982 MW. Meanwhile,

about 4 percent of registered capacity or an average of 845 MW was accounted to power plants undergoing testing and commissioning.

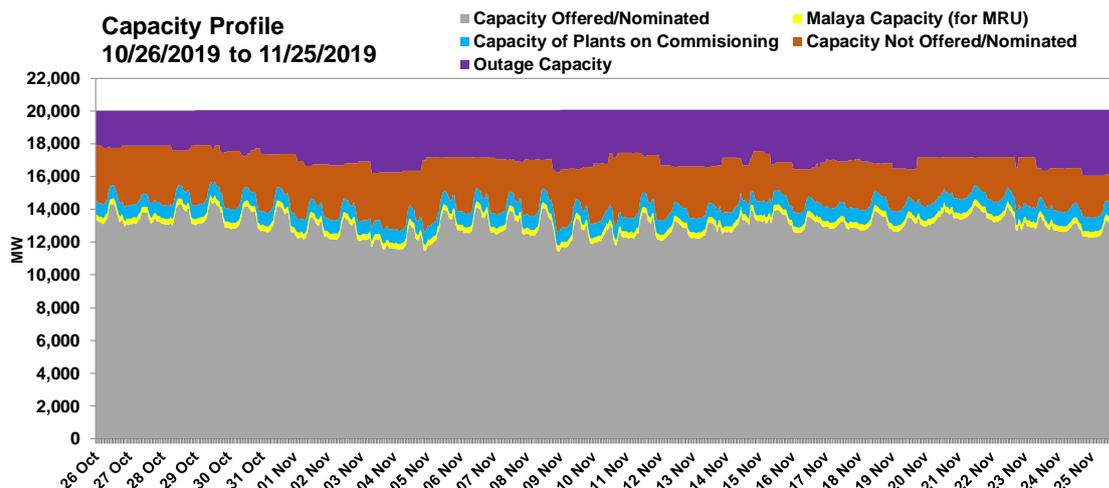


Figure 2. Capacity Profile

Table 1. Monthly Capacity Profile (Ex-ante)

	November 2019		October 2019	
	Average (in MW)	% of RegCap	Average (in MW)	% of RegCap
Outage Capacity	3,071	15%	2,408	12%
Capacity Not Offered/Nominated	2,810	14%	2,706	14%
Capacity of Plants on Commissioning	845	4%	966	5%
Malaya Capacity (for MRU)	350	2%	350	2%
Capacity Offered/Nominated	12,982	65%	13,538	68%
Registered Capacity (by the end of the billing month)	20,082		19,992	

2.2. Outage Capacity

About 15 percent of the total registered capacity or an average of 3,071 MW was on outage. Majority of the outage was classified as planned, averaging at 1,741 MW or 54 percent of the total outage capacity. Maintenance outages, averaging at 392 MW, accounted for 12 percent of the total outage capacity while the remaining 2 percent or an average of 55 MW was on the account of plants on deactivated shutdown.

This month's average outage capacity was 28 percent higher than previous month's average at 2,400 MW.

Based on type of resource, 65 percent or an average of 1,984 MW was attributable to coal plants namely: the maintenance outage of Mariveles CFTPP unit 1 which persisted starting 20 September, forced outages of SBPL CFTPP, and Sual CFTPP unit 2 and planned outages of Calaca CFTPP unit 2, Masinloc CGTPP unit 2, Pagbilao CFTPP unit 3, and Sual CFTPP unit 1. It is also noted that the outage of coal plants increased by 111 percent this billing month. Meanwhile, natural gas plants' outage decreased by 66 percent due to the

resumption in operations of the Malampaya gas field last month which sufficiently supplied natural gas plants.

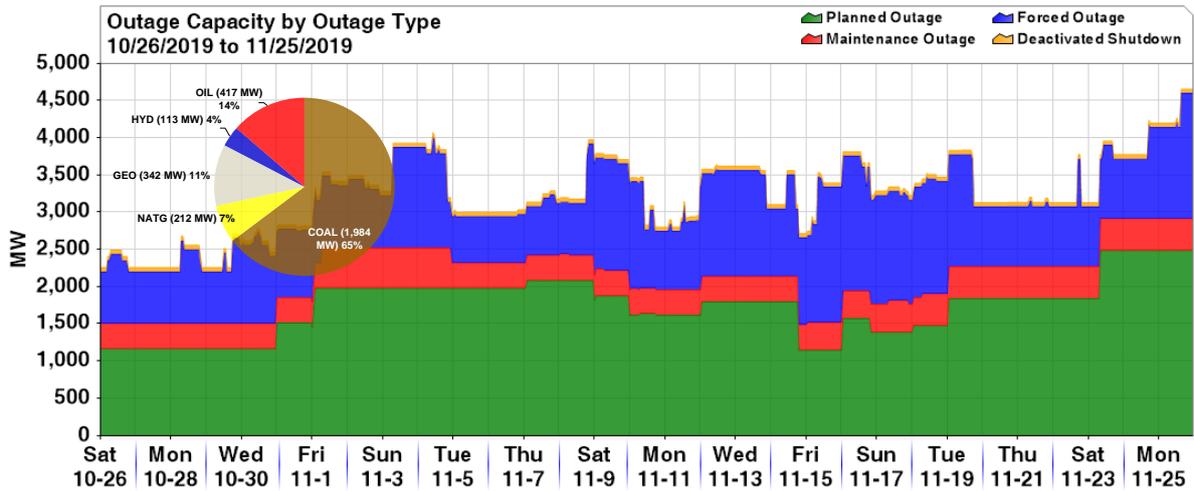


Figure 3. Outage Capacity by Outage Category

2.3. Supply and Demand

Average effective supply decreased by 4.6 percent from previous month's 13,720 MW to current month's 13,087 MW level with the outage of major power plants. Demand plus reserve schedule likewise decreased by 4.7 percent to an average of 11,262 MW from last month's 11,819 MW given the cooler temperatures recorded this month. Driven by the higher MW-decrease in supply, supply margin by 4 percent or an average of 1,825 MW from 1,901 MW in October.

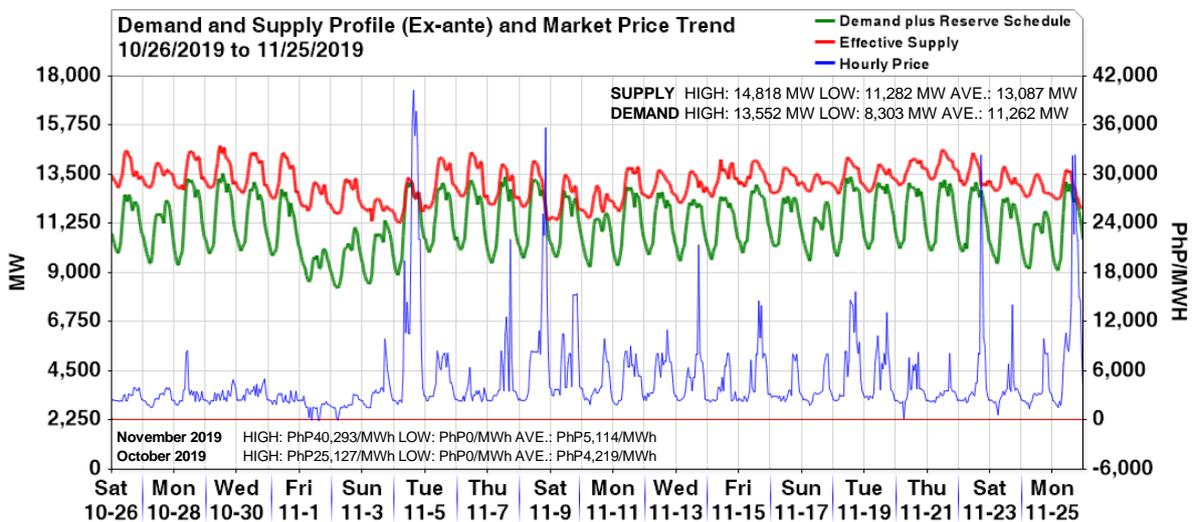


Figure 4. Demand and Supply Profile vs. Market Prices

2.4. Market Prices

Market prices climbed to an average of PhP5,114/MWh this month from previous month's PhP4,219/MWh following the tighter supply margin in the grid.

The resulting high prices manifested in several instances of price spikes caused by the high level of outage from large capacity generating plants. The highest price spike at PhP40,293/MWh which was recorded on 4 November at 1600H was due to the forced outage of Sual CFTPP unit 1 at 0634H on top of the planned outages of San Lorenzo NGPP units 1 and 2, and Sual CFTPP unit 2. Similarly, observance of high prices reaching up to PhP35,709.49/MWh on 8 Nov was the result of the forced outage of Sual CFTPP unit 1. By the end of the November billing month, particularly on 22 and 25 Nov, outage of the following large coal plants resulted to the price spike on the said dates: Sual CFTPP units 1 and 2, QPPL CFTPP, and SBPL CFTPP.

In addition to the outages of the foregoing plants, the planned outages of Calaca CFTPP unit 2, KEPCO CFTPP unit 1, and Masinloc CFTPP unit 2 and the maintenance outage of Mariveles CFTPP unit 1 which occurred prior the November billing month contributed to the increase in average market price.

3. Structural Competition Indices

3.1. Pivotal Plants

As a result of the narrower supply margin, the market RSI remains below the 100-percent mark in 24 percent of the time in the November billing month indicating the frequent presence of pivotal suppliers. Most frequent pivotal suppliers during the billing month were Ilijan NGPP, Sta. Rita NGPP, and Pagbilao CFTPP.

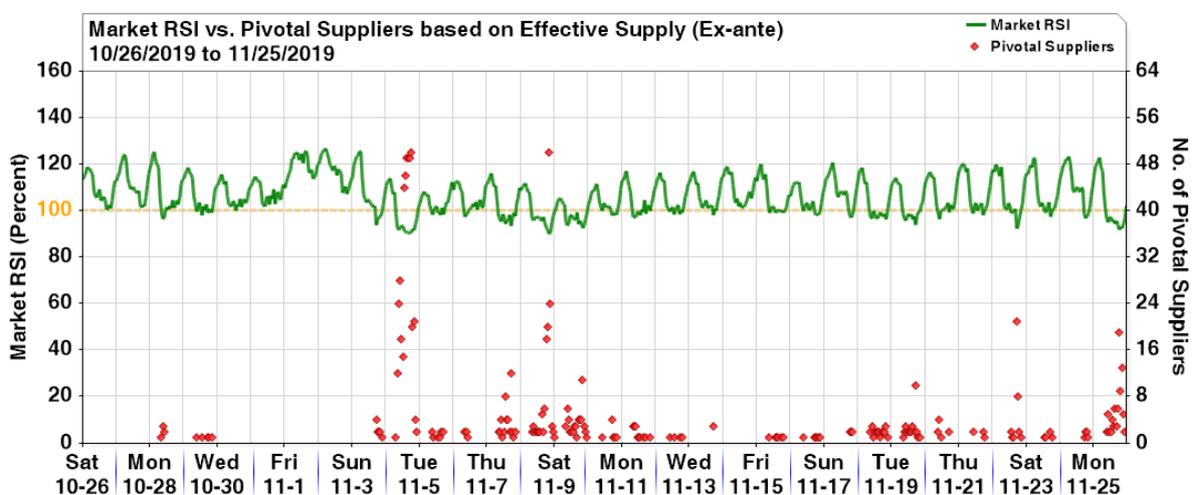


Figure 5. Market RSI vs. Pivotal Suppliers

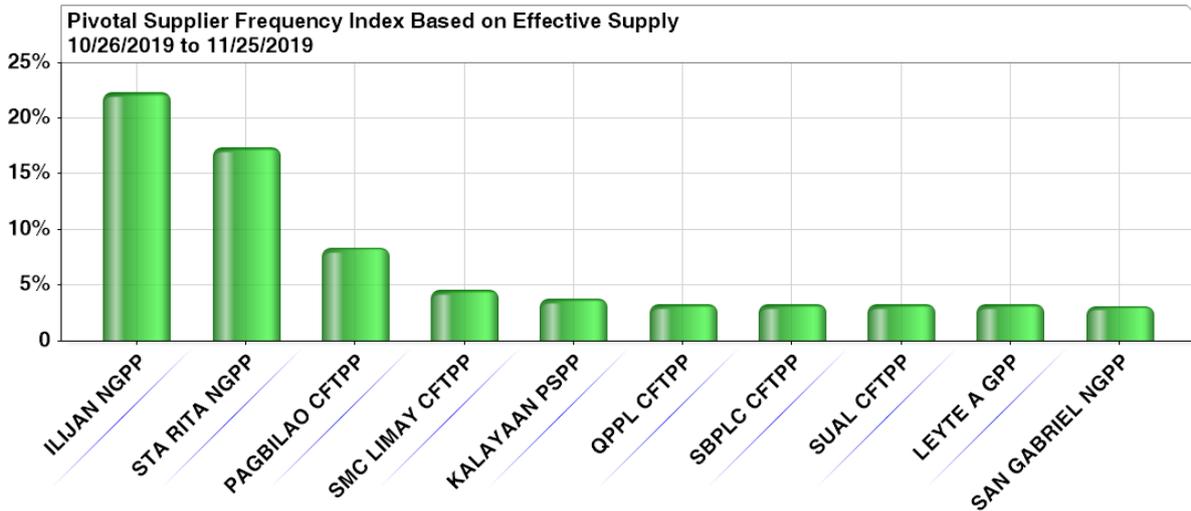


Figure 6. Top Pivotal Plants

3.2. Market Concentration

San Miguel Corporation (SMC), Aboitiz Power (AP), First Gen Corporation (FGC) and Power Sector Asset and Liabilities Management (PSALM) continued to dominate the market with their combined market share comprising of 68.7 percent of the total registered capacity in the WESM. SMC held the top spot at 24.0 percent followed by AP at 19.7 percent, FGC came in third at 14.4 percent and lastly, PSALM at 10.6 percent.

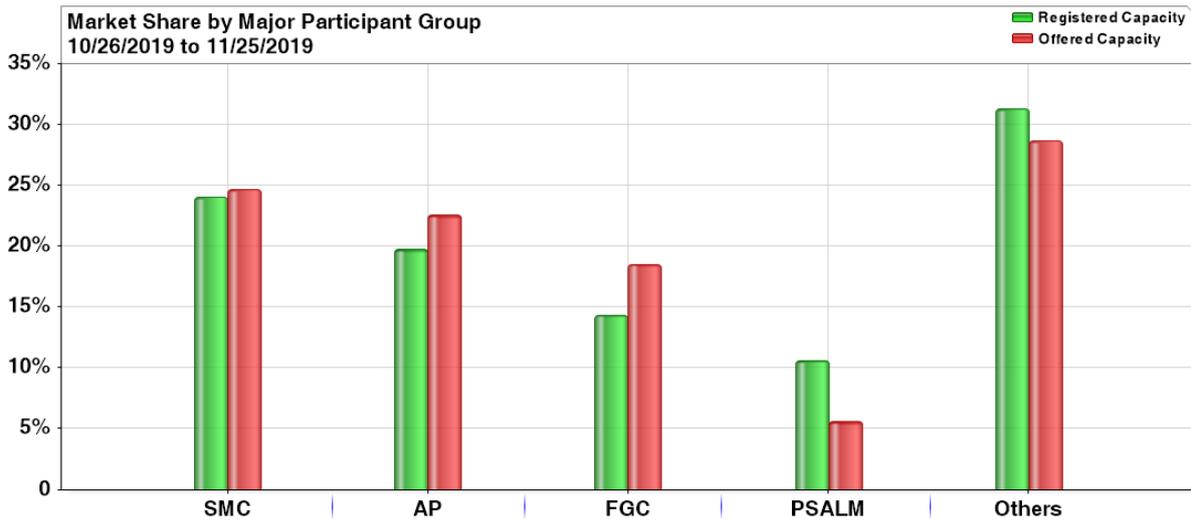


Figure 7. Market Share

The market share of SMC based on offered capacity was recorded at 24.6 percent. This was a 7.7 percent decrease from its previous 26.7 percent share. AP, on the other hand, recorded a growth from 21.9 percent to 22.6 percent. Similarly, FGC recorded a positive change in market share from 17.8 percent to 18.5 percent. Accordingly, the Herfindahl-Hirschman Index (HHI) calculated based on offered capacity by major participants' grouping indicated a

concentrated market for 2 percent of the time, and moderately concentrated market for 98 percent.

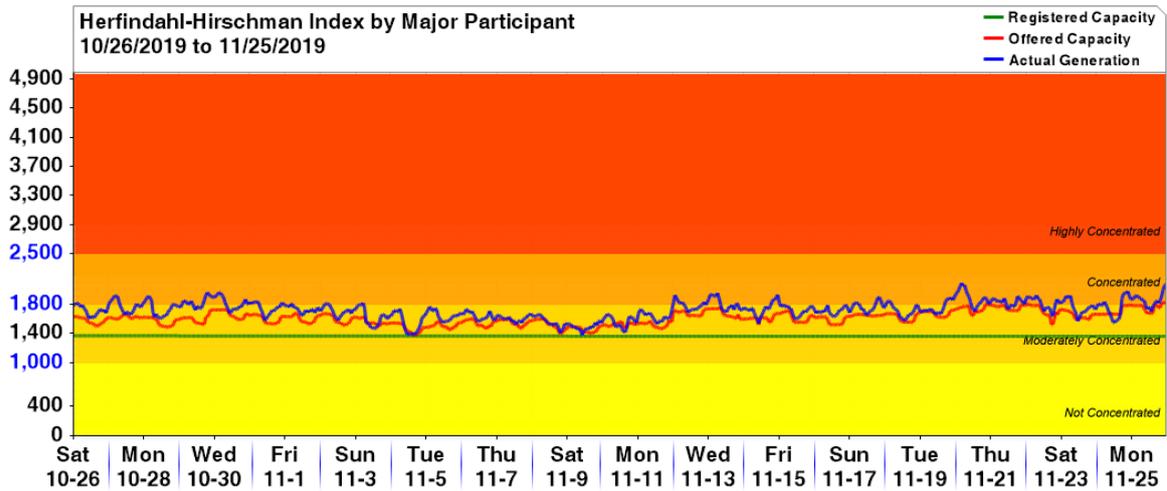


Figure 8. Hourly HHI based on Major Participant Grouping

4. Spot Exposure

Spot market transactions comprised only about 14.5 percent of the total metered quantities, considering that majority of the total energy injected into the grid was covered by bilateral contracts at about 83.5 percent.

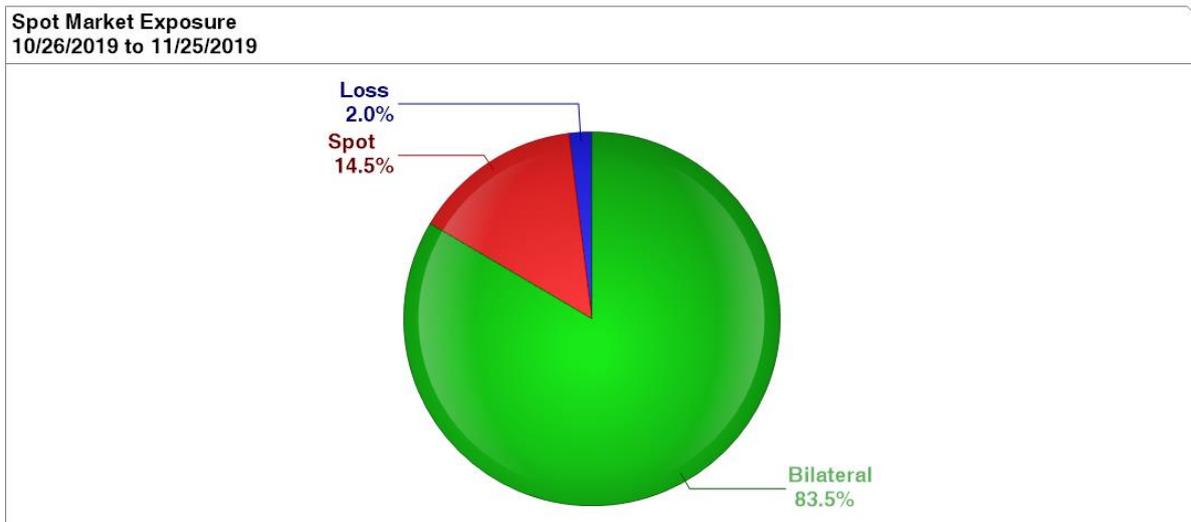


Figure 9. Spot Market Exposure

Annex A. List of Major Plant Outages

Region	Plant Type	Plant/ Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Outage Type	Remarks	Date Commissioned/ Commercial Operation
LUZON	GEO	Makban 6	55	04/11/2013 22:44			Deactivated Shutdown	Conducted gas compressor test	Apr 1979
VISAYAS	GEO	PGPP2 Unit 4	20	06/27/2014 6:07			Forced Outage	Steam being utilized by Nasulo plant	Aug 1983
VISAYAS	GEO	Upper Mahiao 2	32	09/03/2018 6:01			Forced Outage	Tripped	Jul 1997
LUZON	OIL	SLPGC 4	25	11/22/2018 11:56			Maintenance Outage	On extended maintenance shutdown until 24 April 2019	Mar 2018
LUZON	GEO	Makban 5	55	02/08/2019 16:08			Forced Outage	Low Steam Supply. Divert Steam Supply to unit 3	Apr 1979
VISAYAS	OIL	PB102 Unit 1	6	04/28/2019 18:16			Forced Outage	Internal fault	Apr 1981
LUZON	OIL	Malaya 1	300	05/03/2019 18:21			Forced Outage	Declared unavailable due to motorization of unit generator caused by the non-open	Aug 1975
LUZON	NATG	Avion 2	50.3	08/16/2019 0:01			Forced Outage	Gas turbine trouble	Aug 2016
LUZON	COAL	GN Power 1	316	09/20/2019 23:18			Maintenance Outage	To facilitate correction of governor valves	May 2013
VISAYAS	COAL	Kepeco Salcon 1	103	09/22/2019 0:57			Planned Outage	APMS	Nov 2010
VISAYAS	GEO	PGPP1 Unit 1	37.5	10/04/2019 12:41			Forced Outage	Auto-tripped. ongoing investigation on cause of tripping	Aug 1983
VISAYAS	OIL	PB102 Unit 4	6	10/08/2019 19:40	10/29/2019 20:52	21.05	Forced Outage	Internal trouble	Apr 1981
VISAYAS	COAL	TPC Sangi 1	60	10/17/2019 22:15	10/26/2019 15:01	8.70	Forced Outage	Boiler tube leak	Oct 2015
LUZON	COAL	Calaca 2	300	10/17/2019 23:49			Planned Outage	Maintenance Outage until 02 March 2020	Sep 1984
LUZON	COAL	Sual 2	647	10/20/2019 23:48	11/14/2019 18:08	24.76	Planned Outage	Maintenance Outage until 11.17.2019 (2400H)	Oct 1999
LUZON	GEO	Makban 1	63	10/21/2019 13:56			Planned Outage	Annual Overhauling	Apr 1979
LUZON	HYD	Maris 1	3.8	10/21/2019 14:40			Maintenance Outage	Maintenance outage-non GOP	Oct 2017
LUZON	HYD	Maris 2	3.8	10/21/2019 14:54			Maintenance Outage	Maintenance outage-non GOP	Oct 2017
VISAYAS	GEO	Mahanagdong B1	5	10/21/2019 21:14	10/29/2019 20:37	7.97	Forced Outage	To correct AVR problem	Jul 1997
LUZON	GEO	Tiwi 2	59	10/22/2019 10:32	10/31/2019 23:53	9.56	Planned Outage	To give way to the shutdown of PCBs 81TW8.124	Jan 1979
LUZON	COAL	SLTEC 1	121	10/23/2019 18:25	11/01/2019 2:15	8.33	Forced Outage	Boiler tube leak	Apr 2015
LUZON	COAL	SMC 3	150	10/26/2019 4:38	10/26/2019 18:25	0.57	Forced Outage	Feed water control pump leak	Mar 2018
VISAYAS	COAL	TPC Sangi 2	85	10/26/2019 6:47	10/26/2019 14:47	0.33	Forced Outage	TRIPPING OF STATION SERVICE TRANSFORMER	Oct 2015
VISAYAS	COAL	TPC Sangi 1	60	10/26/2019 15:01	11/09/2019 15:32	14.02	Forced Outage	BOILER 7 TGS EMERGENCY CUT-OUT DUE TO HIGH VIBRATION OF BEARING NO. 2	Oct 2015
LUZON	COAL	SMC 1	150	10/28/2019 6:08	10/28/2019 20:06	0.58	Forced Outage	Tripped with 150MW load	May 2017
LUZON	COAL	SMC 2	150	10/28/2019 6:08	10/28/2019 19:02	0.54	Forced Outage	Tripped with 90MW load	Sep 2017
VISAYAS	BIOF	URC 2	40	10/29/2019 5:31			Planned Outage	Isolated as per PANR VRCC-2019-10-0034	Jan 2015
LUZON	NATG	Sta. Rita 2	255.7	10/29/2019 11:39	10/29/2019 13:18	0.07	Forced Outage	Tripped due to GT Enclosure High Temperature	Jun 2000
VISAYAS	COAL	PALM 1	135	10/29/2019 17:27	11/02/2019 11:01	3.73	Forced Outage	under investigation	Aug 2016
VISAYAS	COAL	PEDC 1	83.7	10/29/2019 17:27	11/04/2019 5:21	5.50	Forced Outage	Under Voltage	Nov 2010
VISAYAS	COAL	PEDC 2	83.7	10/29/2019 17:27	10/29/2019 22:46	0.22	Forced Outage	Under Voltage	Apr 2011
VISAYAS	COAL	PEDC 3	150	10/29/2019 17:27	10/30/2019 18:18	1.04	Forced Outage	under investigation	Dec 2016
VISAYAS	COAL	PEDC 2	83.7	10/30/2019 8:02	10/30/2019 13:15	0.22	Forced Outage	Affected by the tripping of Negros-Panay Submarine Cable	Apr 2011
LUZON	COAL	Masinloc 2	344	10/30/2019 23:34			Planned Outage	Planned Outage(GOP)	Jun 1998
LUZON	GEO	Tiwi 1	59	10/31/2019 23:54			Forced Outage	Low steam supply. Divert steam supply to unit 2	Jan 1979
LUZON	NATG	San Lorenzo 1	264.8	11/01/2019 0:58	11/08/2019 23:37	7.94	Planned Outage	Planned Outage until 05 November 2019	Sep 2002
LUZON	NATG	San Lorenzo 2	261.8	11/01/2019 1:44	11/09/2019 23:59	8.93	Planned Outage	Planned Outage until 05 November 2019	Sep 2002
LUZON	COAL	SLTEC 1	121	11/01/2019 5:07	11/01/2019 12:05	0.29	Forced Outage	Tripped due to drum level low	Apr 2015
LUZON	OIL	BPPC 1	65	11/01/2019 6:24	11/04/2019 22:01	3.65	Maintenance Outage	Maintenance Outage until 04 November 2019	Aug 1994
LUZON	OIL	BPPC 2	65	11/01/2019 6:24	11/04/2019 22:01	3.65	Maintenance Outage	Maintenance Outage until 04 November 2019	Aug 1994
LUZON	OIL	BPPC 3	70	11/01/2019 6:24	11/04/2019 22:01	3.65	Maintenance Outage	Maintenance Outage until 04 November 2019	Aug 1994
VISAYAS	COAL	CEDC 1	82	11/02/2019 0:33	11/02/2019 21:58	0.89	Forced Outage	To conduct repair of steam drum leak	Apr 2010
VISAYAS	BIOF	FFHC	13	11/02/2019 1:11	11/05/2019 5:10	3.17	Maintenance Outage	Offline due to weekly maintenance	Feb 2009
VISAYAS	BIOF	HPCO	3	11/02/2019 7:15	11/04/2019 15:02	2.32	Maintenance Outage	Offline for weekly maintenance	Feb 2015
VISAYAS	BIOF	URC 1	40	11/02/2019 7:31	11/05/2019 1:52	2.76	Maintenance Outage	Offline for weekly maintenance	Jan 2015
LUZON	COAL	Sual 1	647	11/03/2019 6:34	11/04/2019 19:33	1.54	Forced Outage	Tripped with 542MW load.(RECLASSIFIED FROM FORCE. OMC OUTAGE)	Oct 1999
LUZON	NATG	Ilijan B2	190	11/04/2019 9:44	11/04/2019 11:44	0.08	Forced Outage	Tripped with 190MW load	Jun 2002
VISAYAS	GEO	Mahanagdong A2	5	11/05/2019 5:07			Forced Outage	To facilitate replacement of exciter busted diode. ETD-- 07 Nov 2019 at 0500H.	Jul 1997
VISAYAS	COAL	Kepeco Salcon 2	103	11/07/2019 1:21			Planned Outage	UNIT CUT-OUT FOR ANNUAL PMS	Mar 2011
VISAYAS	GEO	Upper Mahiao 1	32	11/07/2019 15:24			Forced Outage	Ground fault.	Jul 1997
VISAYAS	GEO	Leyte 1	41	11/07/2019 19:52			Forced Outage	Lube oil trip. block pressure low.	Jun 1983
LUZON	COAL	Sual 1	647	11/08/2019 18:52	11/10/2019 9:21	1.60	Forced Outage	Emergency Shutdown due to Boiler Tube Leak	Oct 1999
LUZON	COAL	SMC 3	150	11/08/2019 19:38	11/16/2019 13:48	7.76	Forced Outage	Emergency Shutdown due to Boiler Tube Leak	Mar 2018
LUZON	OIL	Limay 2	60	11/09/2019 0:05			Planned Outage	Planned Outage	May 1993
LUZON	NATG	Sta. Rita 4	264	11/10/2019 13:15	11/10/2019 16:34	0.14	Forced Outage	Tripped at 112MW load	Oct 2001
LUZON	COAL	SLTEC 2	122.9	11/11/2019 10:02			Forced Outage	Boiler tube leak.	Feb 2016
LUZON	NATG	Ilijan A3	220	11/11/2019 12:14	11/11/2019 13:28	0.05	Forced Outage	Tripped with 154MW load.	Jun 2002
LUZON	COAL	SBPL	455	11/11/2019 23:14	11/13/2019 20:11	1.87	Forced Outage	Pressure Relief Device protection activation of Unit Transformer	Oct 1999
LUZON	HYD	Kalayaan 2	180	11/12/2019 0:01	11/16/2019 19:39	4.82	Planned Outage	Planned Outage until 17 November 2019	Aug 1982
LUZON	COAL	SBPL	455	11/14/2019 10:52	11/14/2019 16:12	0.22	Forced Outage	Tripping of Primary Air and Forced Draft Fan	Oct 2019
LUZON	NATG	Sta. Rita 1	257.3	11/14/2019 18:22	11/16/2019 16:28	1.92	Forced Outage	Tripped while on the process of fuel changeover due to combustion chamber trouble	Jun 2000
VISAYAS	GEO	Upper Mahiao 3	32	11/15/2019 0:31			Maintenance Outage	Corrective maintenance for turbine bearing high vibration scheduled until Nov. 18	Jul 1997
LUZON	COAL	Sual 2	647	11/15/2019 7:50	11/19/2019 17:42	4.41	Forced Outage	Boiler Tube Leak	Oct 1999
LUZON	COAL	Pagbilao 3	420	11/16/2019 0:59			Planned Outage	Planned Outage (GOP).	Mar 2018
LUZON	NATG	Sta. Rita 1	257.3	11/16/2019 17:28	11/16/2019 19:07	0.07	Forced Outage	Tripped due to GT High Temperature	Jun 2000
LUZON	OIL	Limay 4	90	11/18/2019 0:01			Planned Outage	Maintenance Outage until 18 December 2019	May 1993
VISAYAS	GEO	PGPP1 Unit 3	37.5	11/18/2019 1:21	11/24/2019 17:49	6.69	Forced Outage	Auto-tripped with indication-- Overspeed. Affected by earthquake	Aug 1983
LUZON	GEO	Tiwi 6	57	11/18/2019 6:08			Maintenance Outage	Maintenance Outage(APRI requested) until 25 November 2019..	Jan 1979
LUZON	HYD	Kalayaan 3	180	11/19/2019 0:01			Planned Outage	Planned Outage until 06 December 2019	May 2004
LUZON	HYD	Kalayaan 4	180	11/19/2019 0:01			Planned Outage	Planned Outage until 10 December 2019	May 2004
VISAYAS	GEO	Mahanagdong B1	5	11/19/2019 10:41			Forced Outage	Due to condenser level high.	Jul 1997
LUZON	BIOF	IBEC	18.3	11/20/2019 11:03	11/23/2019 0:02	2.54	Forced Outage	Travelling grate trouble	Jul 2015
LUZON	COAL	ANDA 1	72	11/21/2019 7:15	11/21/2019 9:01	0.07	Forced Outage	Main stop valve trouble	Sep 2016
LUZON	COAL	Sual 2	647	11/22/2019 16:40	11/22/2019 18:53	0.09	Forced Outage	Tripping of Boiler feed pump C.	Oct 1999
LUZON	COAL	Sual 1	647	11/23/2019 7:45			Planned Outage	Planned Outage	Oct 1999
LUZON	COAL	QPPL	460	11/24/2019 16:51			Forced Outage	Inlet Valve trouble of Forced Draft Fan(FDF)-A and High Furnace Pressure.	May 2000
VISAYAS	BIOF	FFHC	13	11/25/2019 12:05			Forced Outage	Emergency shutdown to conduct vegetation clearing along their 69KV line	Feb 2009
LUZON	COAL	SBPL	455	11/25/2019 14:28			Forced Outage	Induced Draft Fan (IDF) hydraulic leak trouble.	Oct 2019