Annual Market Assessment Report

26 November 2019 to 25 November 2020

JULY 2021

This Report is prepared by the
Philippine Electricity Market Corporation –
Market Assessment Group for the
Market Surveillance Committee

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ANNUAL MARKET ASSESSMENT REPORT

This Annual Market Assessment Report (AMAR) provides an assessment of results of the integrated Luzon and Visayas operations of the Wholesale Electricity Spot Market (WESM) for the period of Cool Dry Season (26 November 2019 to 25 February 2020), Hot Dry Season (26 February to 25 May 2020), and Rainy Season (26 May to 25 November 2020) of the year 2020. This report likewise sets out an overview of the results of market performance, trends and drivers which in turn provide the means to assess competition and conditions in the WESM, as well as the bidding behavior of trading participants.

I. Highlights of the Market

A. Cool Dry Season

- In December 2019, the onslaught of Typhoon Tisoy rendered several plants on outage, recording the highest monthly and hourly average outage capacity since August 2014.
- Consequently, December 2019 noted the highest monthly LWAP driven by the narrowest supply margin for the year due to the highest outage level.
- Breakdown of the season's market Intervention events:

Table 1. Market Intervention Events, Cool Dry 2020

Number of Market Intervention Events	Reason for Market Intervention
106 SO-initiated in Luzon (12 to 17 January 2020)	Multiple tripping of major transmission lines due to eruption of Taal Volcano
9 SO-initiated in Visayas (25 December 2019)	Tripping of Tabango-Kananga 230 kV lines due to Typhoon Ursula

B. Hot Dry Season

- Occurrence of depressed demand and price during summer months, amidst the anticipation of a high level of demand and price, ensued from the implementation of strict community quarantine measures to combat the Coronavirus Disease 2019 (COVID-19).
- April 2019 recorded the highest monthly average supply margin which accordingly led to the lowest market prices since 2015.
- After experiencing a drastic decline, demand started regaining normalcy with the relaxation of quarantine protocols in May 2020, although market prices remained low at around PHP2,000/MWh.

C. Rainy Season

- Continuous implementation of community quarantine throughout the rainy season still resulted in unusually low market prices.
- The first yellow grid status alert for the year occurred during the June billing month for 3 consecutive intervals caused by thin operating reserve in the Luzon grid.
- In September, it was the first time during the community quarantine that the monthly average level of demand was higher than last year.
- The SPEX Malampaya gas supply restriction in September effectively curtailed supply from natural gas plants.
- Passage of strong tropical typhoons resulted in numerous power disturbances across the Luzon grid, resulting in a drop in demand and supply.
- Breakdown of the season's market intervention and market suspension events:

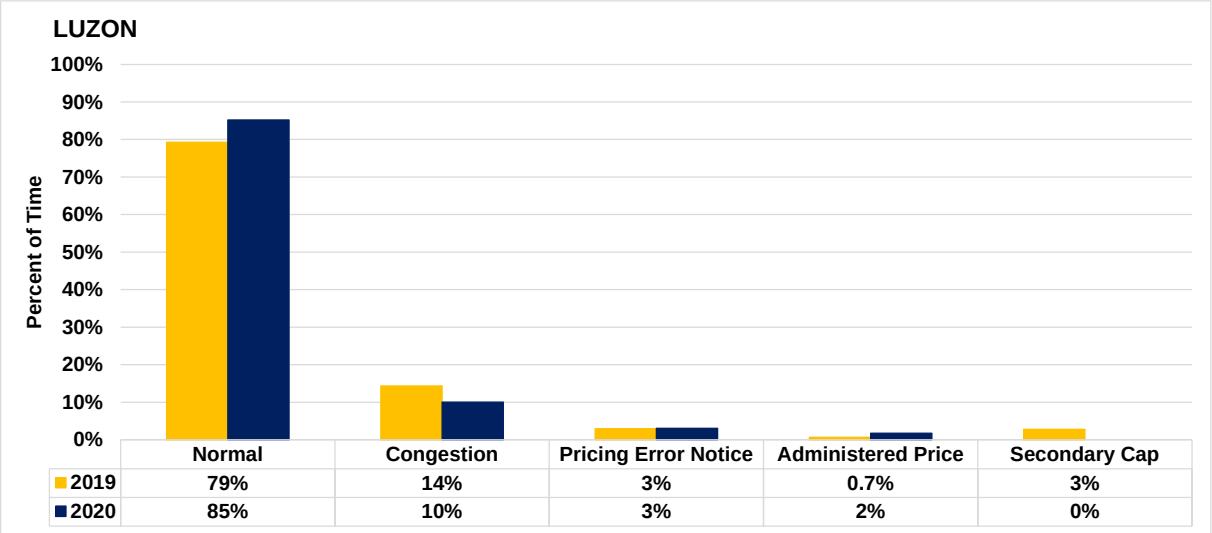
Table 2. Market Intervention and Market Suspension Events, Rainy 2020

Number of Events	Reason for MI/MS
9 SO-initiated Market Interventions in Luzon (12 November 2020)	Power distrurbance brought about by Typhoon Ulysses
38 Market Suspensions in Luzon (12 to 13 November 2020)	

II. Assessment of the Market

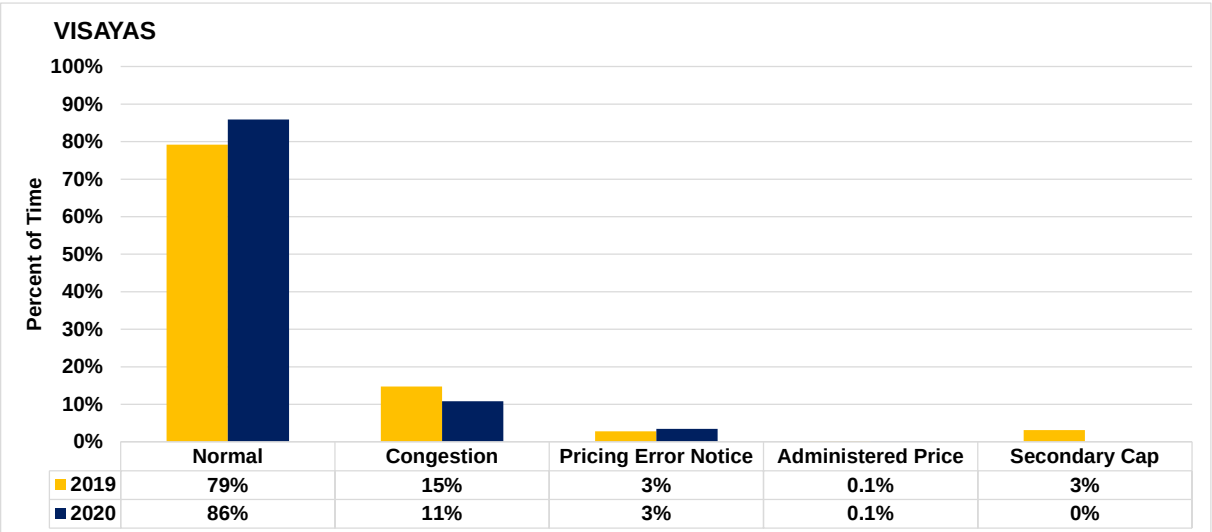
- Majority of the time or 85~86 percent (7,485 trading intervals for Luzon and 7,524 trading intervals for Visayas) of the total market price outcomes in 2020 resulted in a normal pricing condition.
- This was an increase from last year's 79 percent which was mainly attributed to less intervals with congestion.
- An improvement in the congestion situation was observed as Price Substitution Methodology (PSM) was applied to only 10~11 percent (880 trading intervals for Luzon and 948 trading intervals for Visayas) of the outcomes from last year's 14~15 percent. Around 61 percent of the intervals under PSM were due to the frequent congestion of the Samboan-Amlan line connection between the Cebu-Negros islands.
- Prices with pricing error remained around 3 percent of the time both for Luzon (266 trading intervals) and Visayas (303 trading intervals) which was mainly caused by inappropriate input data affecting Luzon and Visayas prices and schedules at around 88 percent and 78 percent of the total intervals with pricing error notices (PEN) for Luzon and Visayas, respectively.
- The frequency of administered prices (AP) resulting from market intervention and market suspension events increased in Luzon from 1 percent (57 trading intervals) to 2 percent (153 trading intervals) in 2020 while retaining its portion in Visayas at 0.1 percent (9 trading intervals) in 2020.

- No interval was imposed with the secondary price cap of PHP6,245/MWh after its last imposition in June 2019.
- The frequency of distinct pricing conditions which differed between Luzon and Visayas regions was due to the regional application of market runs as a result of the binding of the high-voltage, direct current (HVDC) line which links the two regions.



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
2019	79%	14%	3%	0.7%	3%
2020	85%	10%	3%	2%	0%

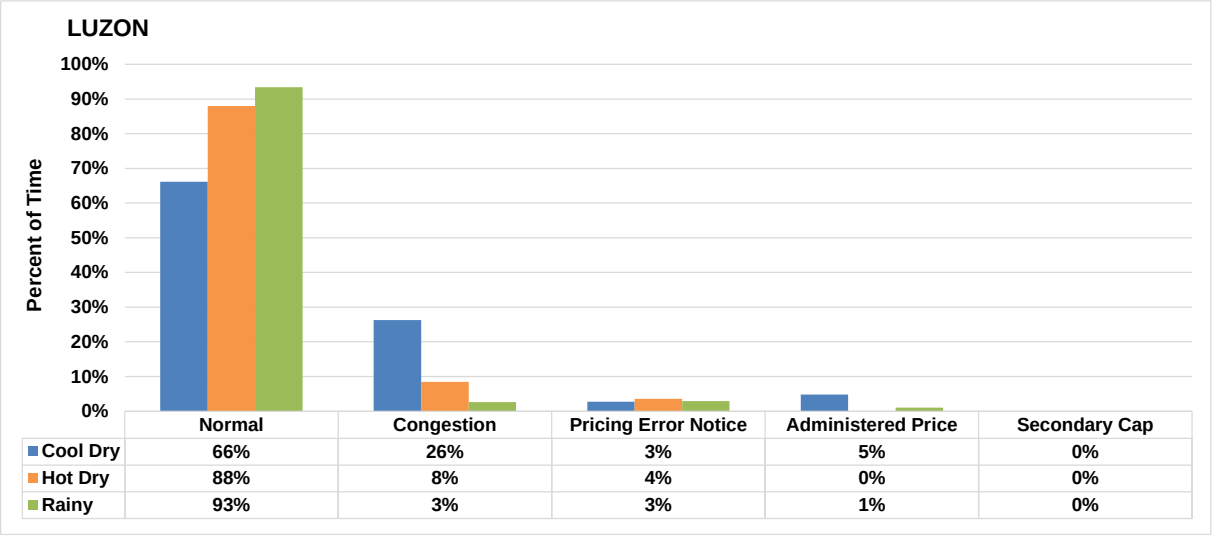
Figure 1. Summary of Pricing Conditions (Ex-ante) in Luzon, 2019 to 2020



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
2019	79%	15%	3%	0.1%	3%
2020	86%	11%	3%	0.1%	0%

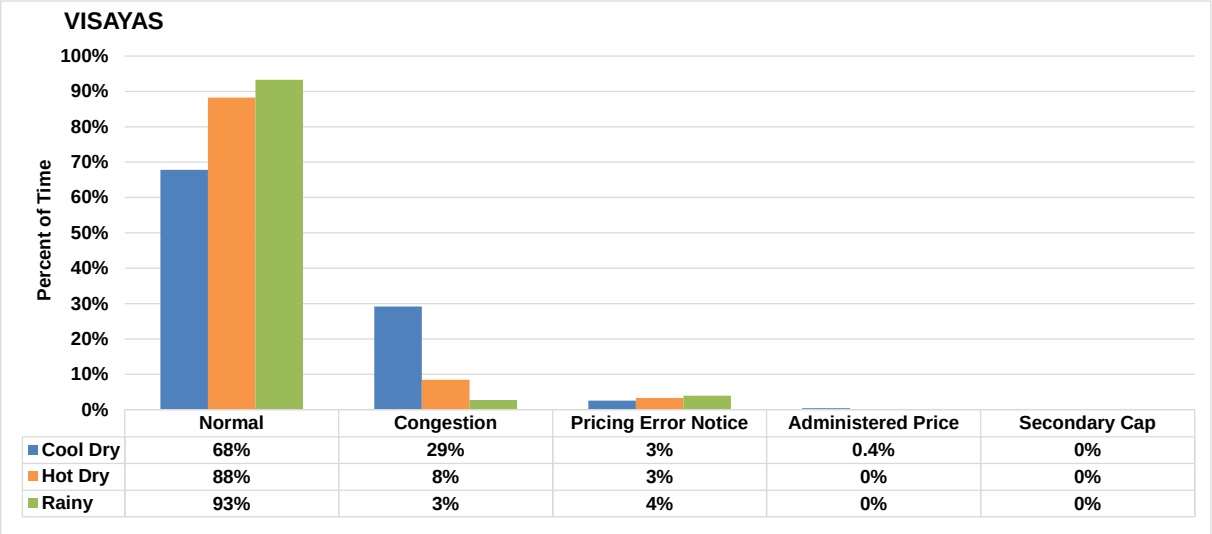
Figure 2. Summary of Pricing Conditions (Ex-ante) in Visayas, 2019 to 2020

- For both regions, the rainy season recorded the most share of normal market pricing outcomes while also noting the lowest in terms of imposition of PSM.
- Intervals with PEN maintained a 3~4 percent share all throughout the year.
- All intervals with market intervention and market suspension events occurred as natural calamities (eruption of Taal Volcano and passage of Typhoon Ursula) caused disturbances in the power grid during the cool dry and rainy season.



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
Cool Dry	66%	26%	3%	5%	0%
Hot Dry	88%	8%	4%	0%	0%
Rainy	93%	3%	3%	1%	0%

Figure 3. Summary of Pricing Conditions (Ex-ante) in Luzon, 2020 Seasons



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
Cool Dry	68%	29%	3%	0.4%	0%
Hot Dry	88%	8%	3%	0%	0%
Rainy	93%	3%	4%	0%	0%

Figure 4. Summary of Pricing Conditions (Ex-ante) in Visayas, 2020 Seasons

III. Market Outcome[1]

A. Price

i. Price and Supply Margin

- The year-on-year load-weighted average price (LWAP) fell by 43 percent from PHP4,894/MWh in 2019 to PHP2,790/MWh in 2020.
- The decrease in yearly average market price factored in the 40 percent climb in the yearly average supply margin.
- The 2020 billing year recorded the lowest yearly average LWAP in the last 5 years.
- The enforced community quarantine in different parts of the country allowed for a wide supply margin, starting 15 March 2021, as businesses and large grid consumers had limited operations to curb the spread of the Covid-19.

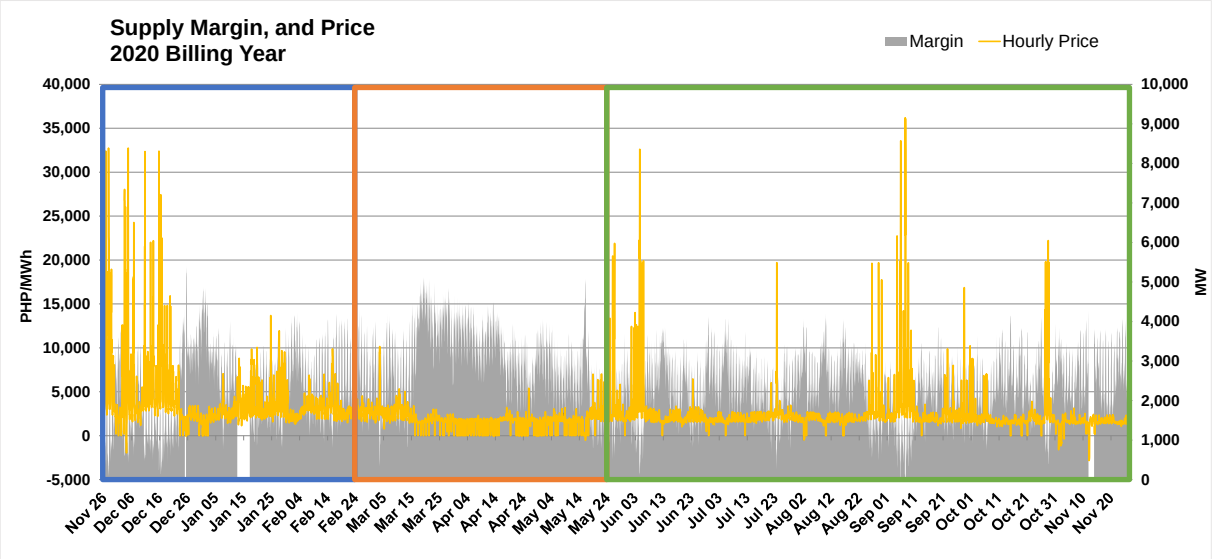


Figure 5. Hourly System LWAP and Hourly Supply Margin, 2019 to 2020

[1] The market prices were represented by the following: (i) ex-ante load weighted average price (LWAP) for trading intervals without pricing error during ex-ante, (ii) ex-post LWAP for trading intervals with pricing error during ex-ante but without pricing error during ex-post, (iii) LWAP based on the market re-run result for trading intervals with pricing error both during ex-ante and ex-post, and (iv) estimated load reference price (ELRP) for trading intervals where the ERC-approved Price Substitution Mechanism (PSM) was applied.

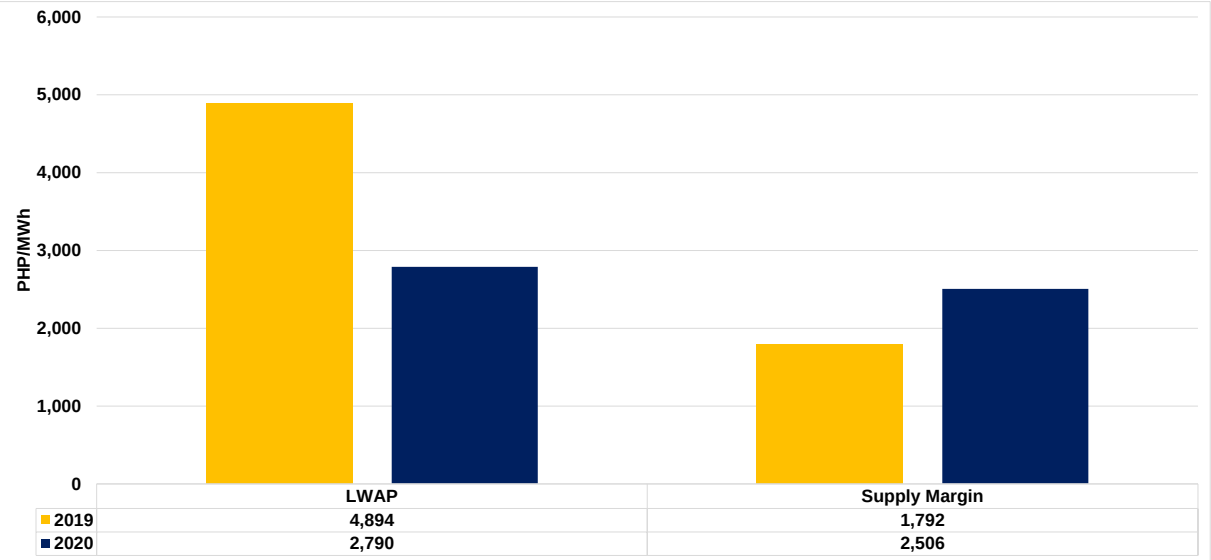


Figure 6. System LWAP and Average Supply Margin, 2019 to 2020

- Only the cool dry season showed a minimal yearly increase in the market price, while the rest of the seasons experienced a drastic drop in average price due to the interaction of demand and supply during the community quarantine:
    - Cool Dry – 2 percent increase from PHP3,981/MWh to PHP4,051/MWh
    - Hot Dry – 69 percent decrease from PHP6,435/MWh to PHP2,010/MWh
    - Rainy – 44 percent decrease from PhP4,547/MWh to PHP2,535/MWh
- Similarly, average supply margin resulted in a significant change in level during the seasons with the implementation of community quarantine:
    - Cool Dry – 10 percent increase from 2,160 MW to 2,368 MW
    - Hot Dry – 129 percent increase from 1,309 MW to 2,993 MW
    - Rainy – 27 percent increase from 1,838 MW to 2,331 MW

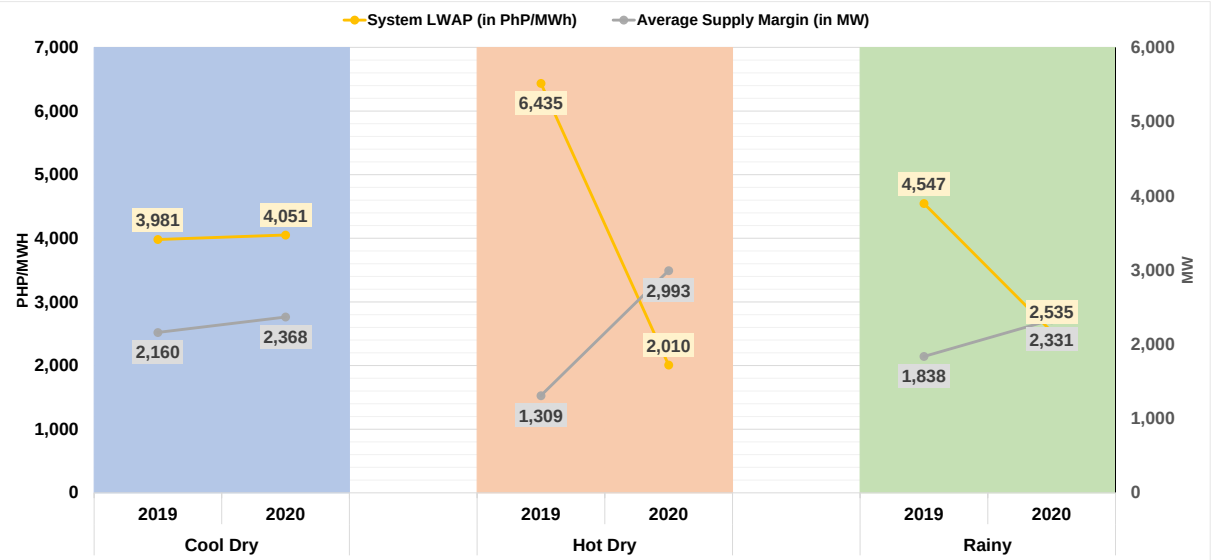


Figure 7. System LWAP and Average Supply Margin, 2019 to 2020 Seasons

- Average price of peak hours during the hot dry season saw the greatest decline at around 75 percent and almost leveled with the corresponding average off-peak price in 2020.
- Off-peak prices in the hot dry and rainy season of 2020 maintained its average at around PHP2,000/MWh; meanwhile, a growth in the peak prices for the rainy season corresponded to the gradual relaxation of community quarantine protocols

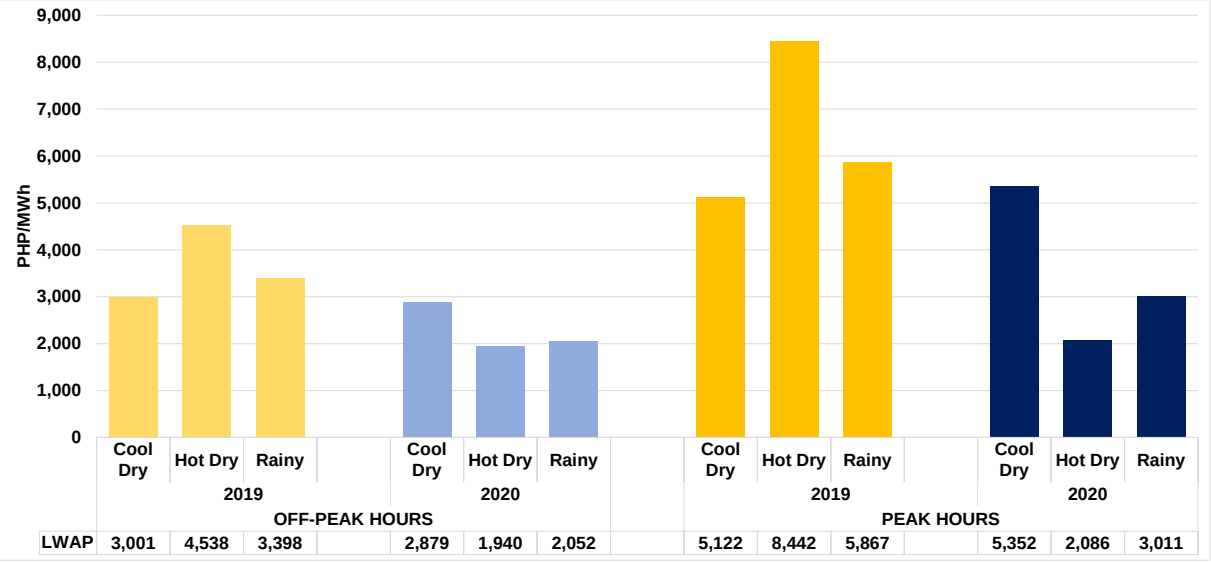
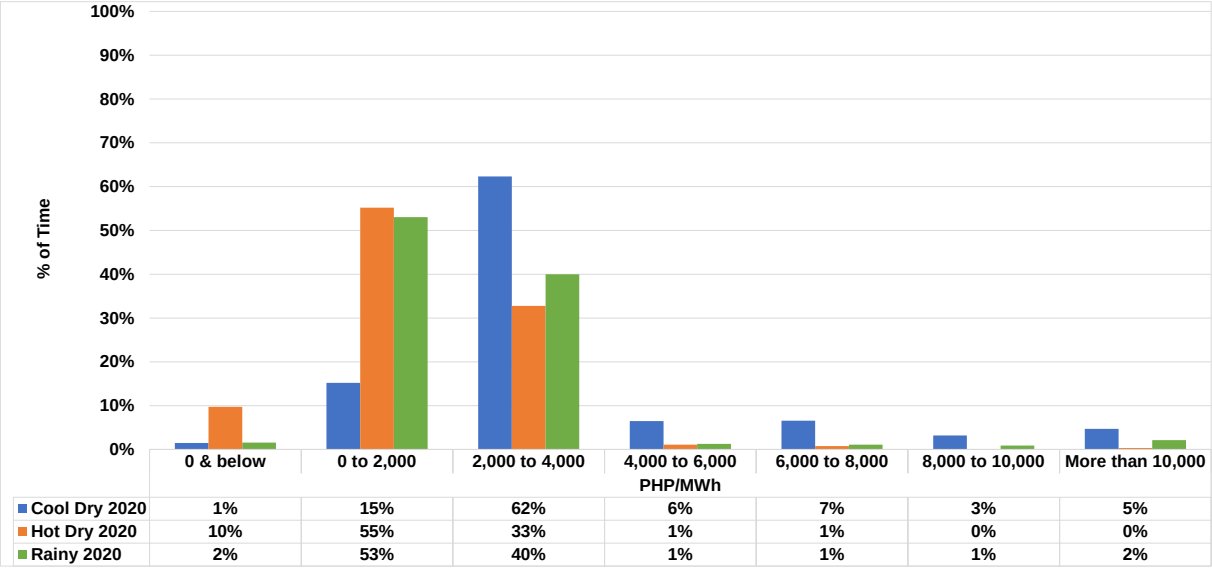


Figure 8. System LWAP Based on Hour Type, 2019 to 2020 Seasons

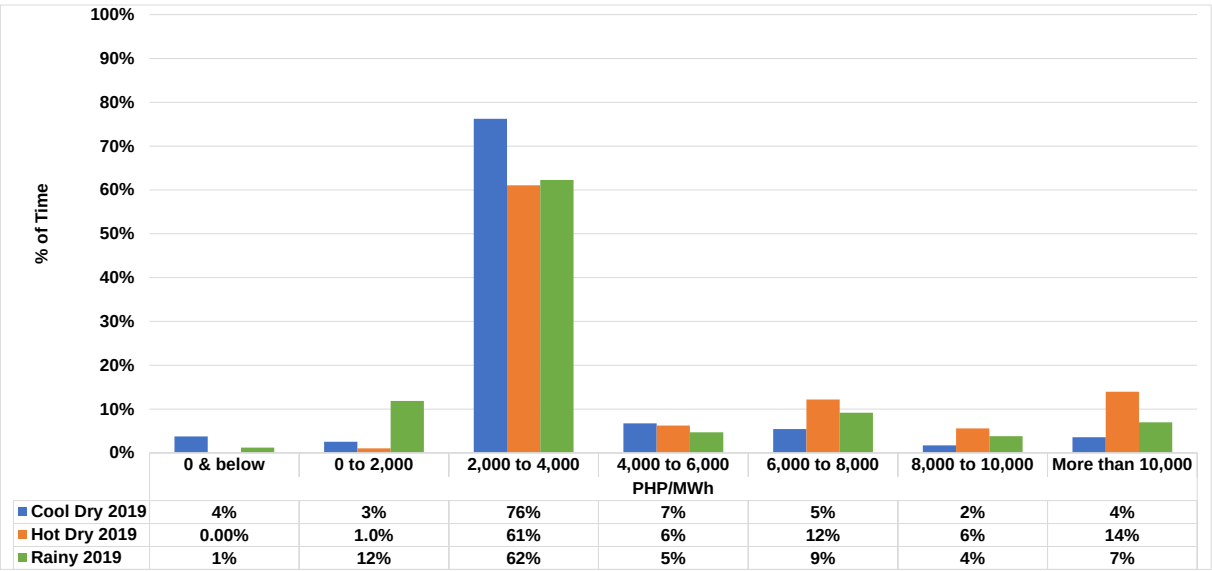
ii. Price Distribution

- Majority of the hourly prices in 2020 lie within the PHP0/MWh to PHP2,000/MWh range as compared to last year when most were within the PhP2,000/MWh to PhP4,000/MWh range.
- Remarkably, the hot dry season recorded the highest percentage of prices below PHP0/MWh among the seasons.
- Prices above PHP4,000/MWh majorly persisted in the market during the cool dry season prior to the drop in demand due to the pandemic.



	0 & below	0 to 2,000	2,000 to 4,000	4,000 to 6,000	6,000 to 8,000	8,000 to 10,000	More than 10,000
Cool Dry 2020	1%	15%	62%	6%	7%	3%	5%
Hot Dry 2020	10%	55%	33%	1%	1%	0%	0%
Rainy 2020	2%	53%	40%	1%	1%	1%	2%

Figure 9. System LWAP Frequency Distribution, 2020 Seasons

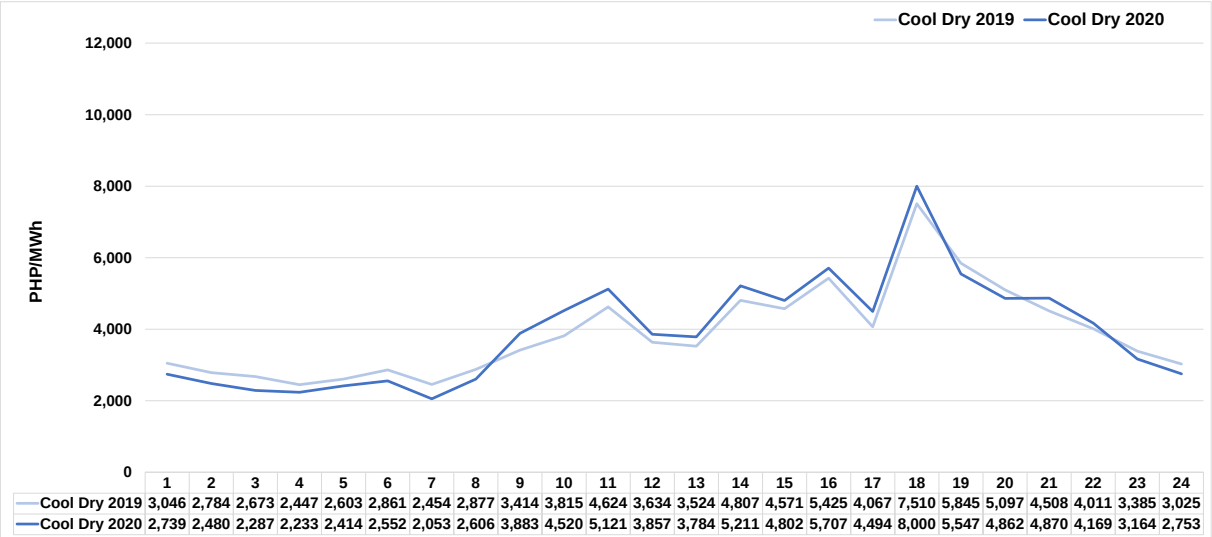


	0 & below	0 to 2,000	2,000 to 4,000	4,000 to 6,000	6,000 to 8,000	8,000 to 10,000	More than 10,000
Cool Dry 2019	4%	3%	76%	7%	5%	2%	4%
Hot Dry 2019	0.00%	1.0%	61%	6%	12%	6%	14%
Rainy 2019	1%	12%	62%	5%	9%	4%	7%

Figure 10. System LWAP Frequency Distribution, 2019 Seasons

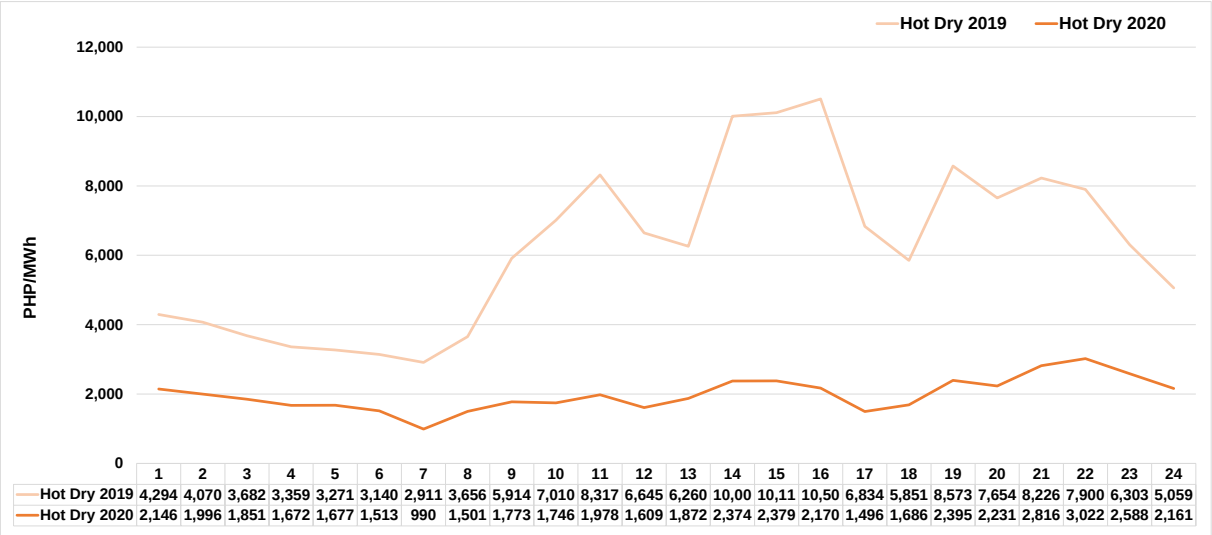
iii. Hourly Price Profile

- In an hourly resolution of a price curve, the cool dry season depicted a similar price pattern from last year, noting a minimal increase.
- The hot dry season maintained an almost flat pattern regardless of the hour which greatly distorted the price profile during the season.
- With the gradual normalization of demand during the rainy season, the resulting price pattern did not deviate much from last year, but declined in level.
- Throughout the different seasons in 2020, market prices peaked at different trading intervals, indicating different patterns of interplay between the supply and demand. Prices peaked at the following season and intervals:
    - Cool Dry – evening at 18H in 2019 and 2020
    - Hot Dry – afternoon at 14H in 2019, and evening at 22H in 2020
    - Rainy – evening at 21H in 2019, and afternoon at 14H in 2020



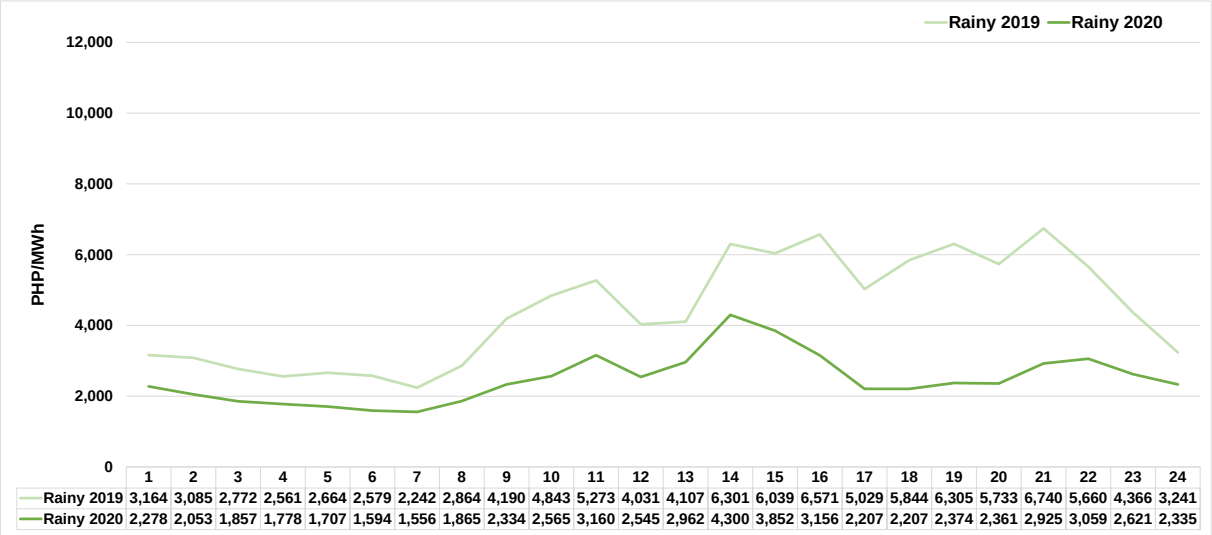
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Cool Dry 2019	3,046	2,784	2,673	2,447	2,603	2,861	2,454	2,877	3,414	3,815	4,624	3,634	3,524	4,807	4,571	5,425	4,067	7,510	5,845	5,097	4,508	4,011	3,385	3,025
Cool Dry 2020	2,739	2,480	2,287	2,233	2,414	2,552	2,053	2,606	3,883	4,520	5,121	3,857	3,784	5,211	4,802	5,707	4,494	8,000	5,547	4,862	4,870	4,169	3,164	2,753

Figure 11. System LWAP Hourly Curve, 2019 to 2020 Cool Dry



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Hot Dry 2019	4,294	4,070	3,682	3,359	3,271	3,140	2,911	3,656	5,914	7,010	8,317	6,645	6,260	10,00	10,11	10,50	6,834	5,851	8,573	7,654	8,226	7,900	6,303	5,059
Hot Dry 2020	2,146	1,996	1,851	1,672	1,677	1,513	990	1,501	1,773	1,746	1,978	1,609	1,872	2,374	2,379	2,170	1,496	1,686	2,395	2,231	2,816	3,022	2,588	2,161

Figure 12. System LWAP Hourly Curve, 2019 to 2020 Hot Dry



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Rainy 2019	3,164	3,085	2,772	2,561	2,664	2,579	2,242	2,864	4,190	4,843	5,273	4,031	4,107	6,301	6,039	6,571	5,029	5,844	6,305	5,733	6,740	5,660	4,366	3,241
Rainy 2020	2,278	2,053	1,857	1,778	1,707	1,594	1,556	1,865	2,334	2,565	3,160	2,545	2,962	4,300	3,852	3,156	2,207	2,207	2,374	2,361	2,925	3,059	2,621	2,335

Figure 13. System LWAP Hourly Curve, 2019 to 2020 Rainy

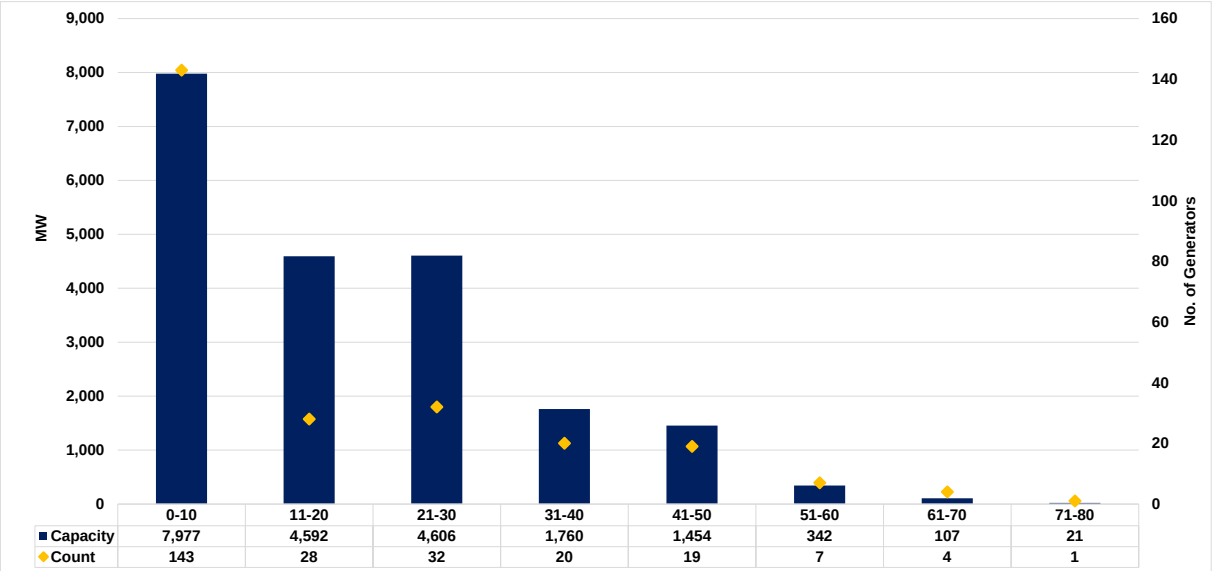
B. Supply

i. Capacity Profile

- Based on age[2] of power plants, relatively newer plants, 171 out of 254 generator resources, within the age range of 0-20 years have an aggregate capacity of 12,569 MW and have continued to comprise 67 percent of the total WESM registered capacity as of 2020.

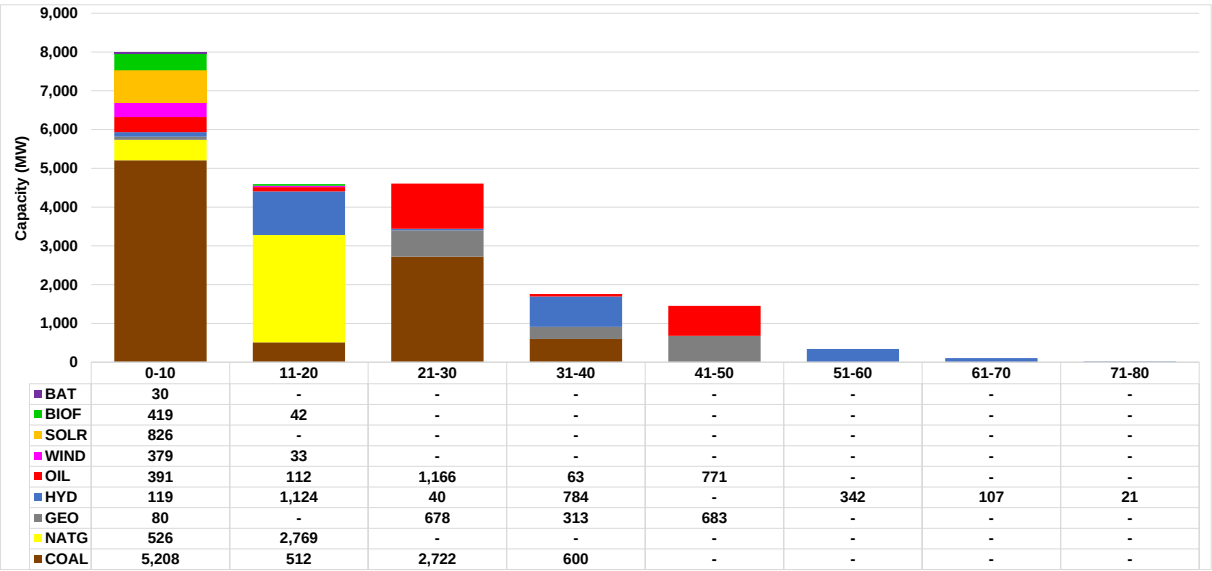
[2] Based on registration date or commercial operations date

- Despite the entry of new plants this year, increasing the total registered capacity by 826 MW, a number of generators beyond 20 years of age remain active in the market with capacities around 40 percent of the total registered capacity.



	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Capacity	7,977	4,592	4,606	1,760	1,454	342	107	21
Count	143	28	32	20	19	7	4	1

Figure 14. Capacity Profile by Age of Plants, 2020



	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
BAT	30	-	-	-	-	-	-	-
BIOF	419	42	-	-	-	-	-	-
SOLR	826	-	-	-	-	-	-	-
WIND	379	33	-	-	-	-	-	-
OIL	391	112	1,166	63	771	-	-	-
HYD	119	1,124	40	784	-	342	107	21
GEO	80	-	678	313	683	-	-	-
NATG	526	2,769	-	-	-	-	-	-
COAL	5,208	512	2,722	600	-	-	-	-

Figure 15. Capacity Profile by Age of Plants by Resource Type, 2020

- A net increase of 797 MW was accounted in the total registered capacity from 2019 to 2020

- Of the newly registered power plants in the WESM, about 84 percent or 693 MW was attributed to the entry of coal plants.
- Changes in capacity accounted the 14.1 MW uprating and 41.7 MW derating of various existing plant capacities.
- No plant capacities were disaggregated into several units.
- A total capacity of 1.5 MW ceased registration in the WESM which was attributed to one solar plant.
- Motivated by the need for a more flexible, sustainable, and cleaner power supply, DOE Secretary Alfonso G. Cusi signed a department circular imposing moratorium on endorsements of greenfield coal plants on 20 October 2020.

Table 3. Change in WESM Registered Capacity, 2019 to 2020

Plant Type	Market Participant Name	Node ID	Capacity		
			2019	2020	Change
New Registered Plants					
BAT	SMCGP Philippines Energy Storage Co. Ltd.	6KABAN_BAT		20	20
BIOF	Cleangreen Energy Corporation	1CLEANG_G01		10.8	10.8
	Green Innovations for Tomorrow Corporation	1GIFT_G02		6	6
	Isabela La Suerte Rice Mill Corporation	1LASUER_U01		5.1	5.1
	VS Gripal Power Corporation	1VSGRIP_G01		5.4	5.4
COAL	Bataan 2020, Inc.	1BT2020_G02		25	25
	GNPower Dinginin Ltd. Co.	1GNPD_U01		668	668
HYD	Philippine Power and Development Company	3BALUG_G01		1.2	1.2
		3CLBATO_G01		0.3	0.3
		3PALAK_G01		1.6	1.6
	Sta Clara Power Corporation	7LOBOC_G02		1.2	1.2
	BOHECO I Sevilla Mini Hydro Corp.	7SEVILL_G01		2.5	2.5
NATG	Pilipinas Shell Petroleum Corporation	3PSHELL_G01		5	5
OIL	Isabel Ancillary Services Co. Ltd.	4IASMOD_G01		10	10
		4IASMOD_G02		10	10
		4IASMOD_G03		15	15
		4IASMOD_G04		10	10
		4IASMOD_G05		15	15
		4IASMOD_G06		10	10
SOLR	Ecopark Energy of Valenzuela Corp.	2ECOPRK_G01		4	4
				SUB-TOTAL:	**826.1**
Plants that Increased Capacity					
GEO	AP Renewables Inc.	3MKBN_A	126	126.4	0.4
		3MKBN_B	126	126.4	0.4
		3TIWI_A	118	120	2.0
HYD	HEDCOR, Inc.	1NMHC_G01	3.8	3.9	0.1
	Hedcor Sabangan, Inc.	1SABANG_G01	14.3	15	0.7
OIL	1590 Energy Corporation	1BAUANG_G01	200	210	10.0
	Central Negros Power Reliability, Inc.	6CENPRI_U01	4.2	4.3	0.1
		6CENPRI_U02	4.2	4.3	0.1
		6CENPRI_U03	4.2	4.3	0.1
		6CENPRI_U05	6.4	6.6	0.2
				SUB-TOTAL:	**14.1**
Plants that Decreased Capacity					
BIOF	Cagayan Biomass Energy Corporation	1CAGBIO_G01	15	13.5	-1.5
	San Jose City I Power Corporation	1IPOWER_G02	12	10.8	-1.2
	First Farmers Holdings Corporation	6FFHC_G01	13	9	-4
	San Carlos Bioenergy, Inc.	6SCBE_G01	8.3	7.4	-0.9
OIL	Millennium Energy, Inc.	2MILLEN_G01	100	85	-15
	Therma Power Visayas, Inc.	5TPVI_U01	7.4	6.8	-0.6
	Therma Power Visayas, Inc.	5TPVI_U02	7.4	6.7	-0.7
	Therma Power Visayas, Inc.	5TPVI_U03	7.4	6.8	-0.6
	Therma Power Visayas, Inc.	5TPVI_U04	7.4	6.8	-0.6
	Therma Power Visayas, Inc.	5TPVI_U05	7.4	6.8	-0.6
	Therma Power Visayas, Inc.	5TPVI_U06	7.4	6.8	-0.6
	Panay Power Corporation	8GLOBAL_G01	6.8	6.4	-0.4
WIND	PetroWind Energy Inc.	8PWIND_G01	36	21	-15
				SUB-TOTAL:	**-41.7**
Ceased Registration					
SOLR	CW Marketing and Development Corporation	3HDEPOT_G01	1.5		-1.5
				SUB-TOTAL:	**-1.5**
				GRAND TOTAL:	**797**

- Available capacity[3] in the WESM resulted to a 0.5 percent decline with respect to the total registered capacity in the WESM from 72.3 percent to 71.8 percent.

[3] Available capacity refers to the aggregate of Capacity Offered/Nominated, Malaya Capacity for MRU, and Capacity of Plants on Testing and Commissioning

- Average effective supply[4] from last year's 12,905 MW to this year's 13,140 MW maintained a share at around 65 percent.
- One of the reasons for the decline in available supply was the increase in capacities not offered by power plants from 14.2 percent in 2019 to 15.0 percent in 2020.
- Outage capacities sustained an average of 2,654 MW in 2020, comprising 13.1 percent of the total registered capacity.

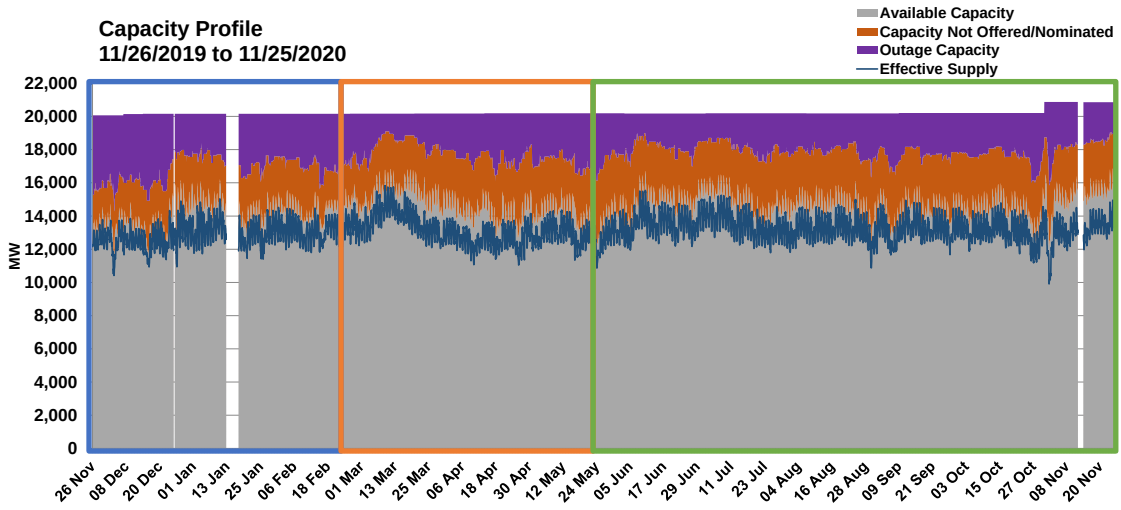


Figure 16. Capacity Profile by Component - Hourly, 2020

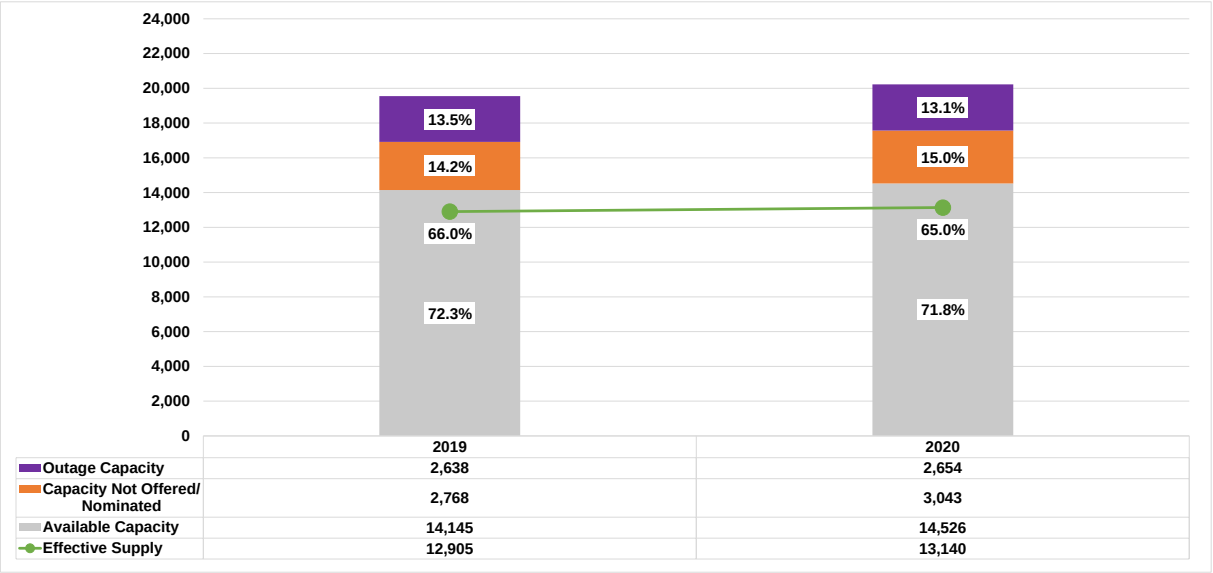
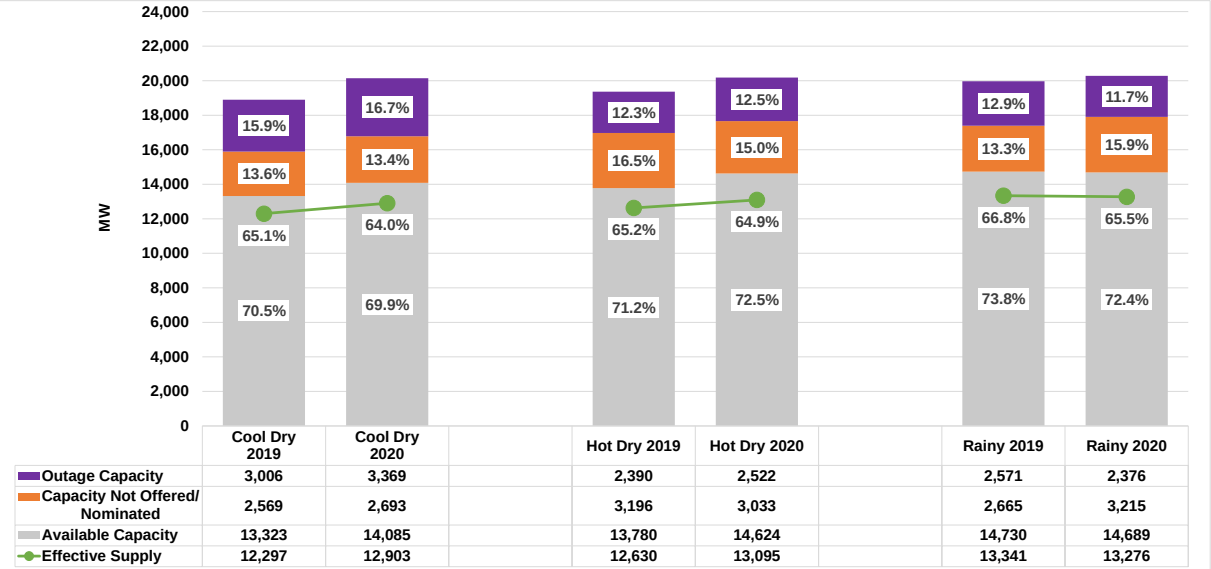


Figure 17. Capacity Profile by Component - Yearly, 2019 to 2020

[4] The system effective supply is equal to the offered capacity of all scheduled generator resources, nominated loading level of non-scheduled generating units and projected output of preferential dispatch generating units adjusted for any security limit and ramp rates. Scheduled output of plants on testing and commissioning, through the imposition of security limit by SO, are accounted for in the effected supply. Likewise included is the scheduled output of Malaya plant when it is called to run as Must Run Unit (MRU).

- Outage capacities were consistently the highest during the cool dry season exploiting a generally low demand in the months of December to February.
- Meanwhile, capacities not offered/not nominated had a high level during the hot dry season as the summer months rendered a high level of capacity unavailable from hydro plants.



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
Outage Capacity	3,006	3,369	2,390	2,522	2,571	2,376
Capacity Not Offered/ Nominated	2,569	2,693	3,196	3,033	2,665	3,215
Available Capacity	13,323	14,085	13,780	14,624	14,730	14,689
Effective Supply	12,297	12,903	12,630	13,095	13,341	13,276

Figure 18. Capacity Profile by Component, 2019 to 2020 Seasons

ii. Capacity Mix and Generation Mix

- In terms of resource types, coal continued to dominate the spot market, holding the largest share of about 43 percent of the total registered capacity.
- The addition of GNP Dinginin CFTPP (668 MW) increased the market share of coal plants by 1 percent, among others.
- All other plant types, except for wind plants, registered minimal increases in registered capacities with oil-based plants coming second, effectively adding 61 MW of capacity.
- Contrary to the growth in registered capacities of majority of the different resource types, wind plant capacities noted a 15-MW decrease, owing solely to the decline in capacity of the PetroWind Energy Inc. wind plant from 36 MW to 21 MW.

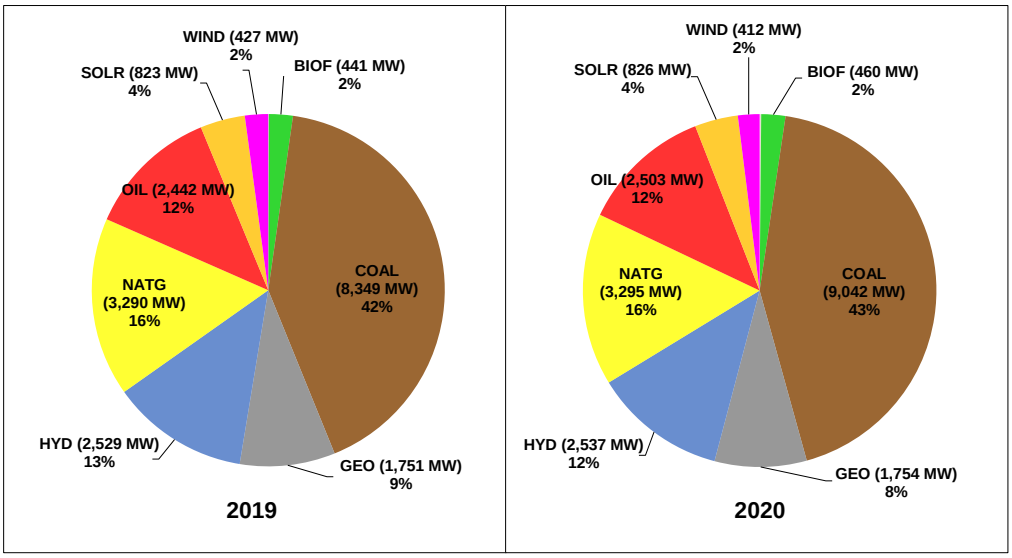


Figure 19. Capacity Mix, 2019 to 2020

- Coal plants in the Luzon region consisted almost half of the entire generation mix in the grid despite having only around 42 percent of registered capacity.
- The Luzon grid likewise relied more on the generation of natural gas plants as it registered a higher generation mix as compared to its capacity mix.
- Hydro plants, however, resulted otherwise as majority of these capacities are more expensive on the average and are also dependent on the availability of water as resource.
- In the Visayas region, registered capacities from coal and geothermal plants both dominated the grid which translated to a high share in terms of generation.

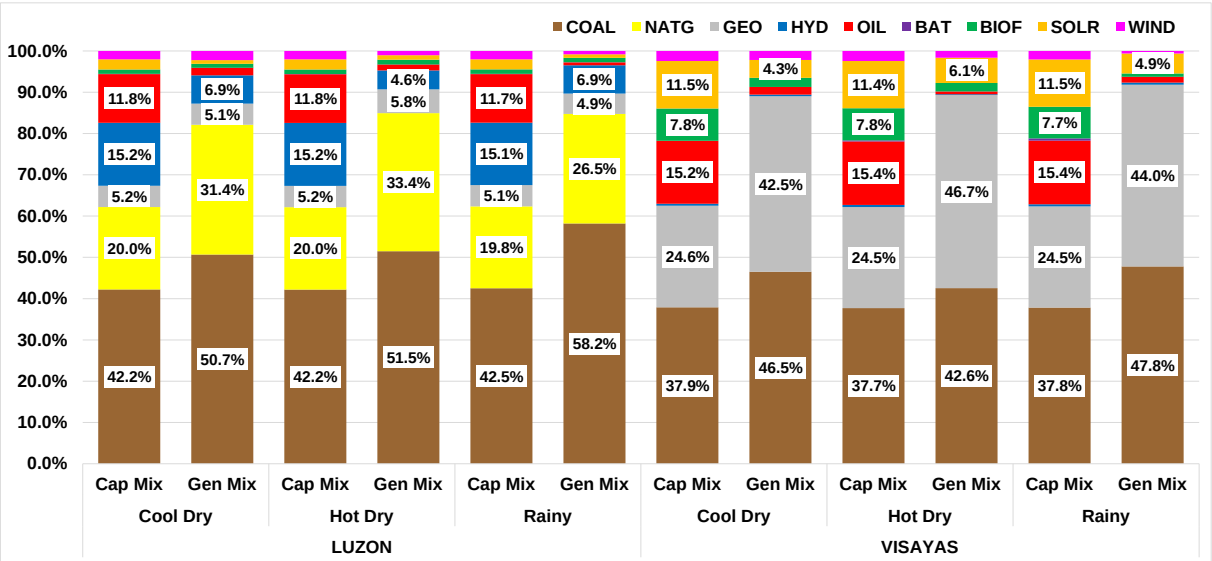
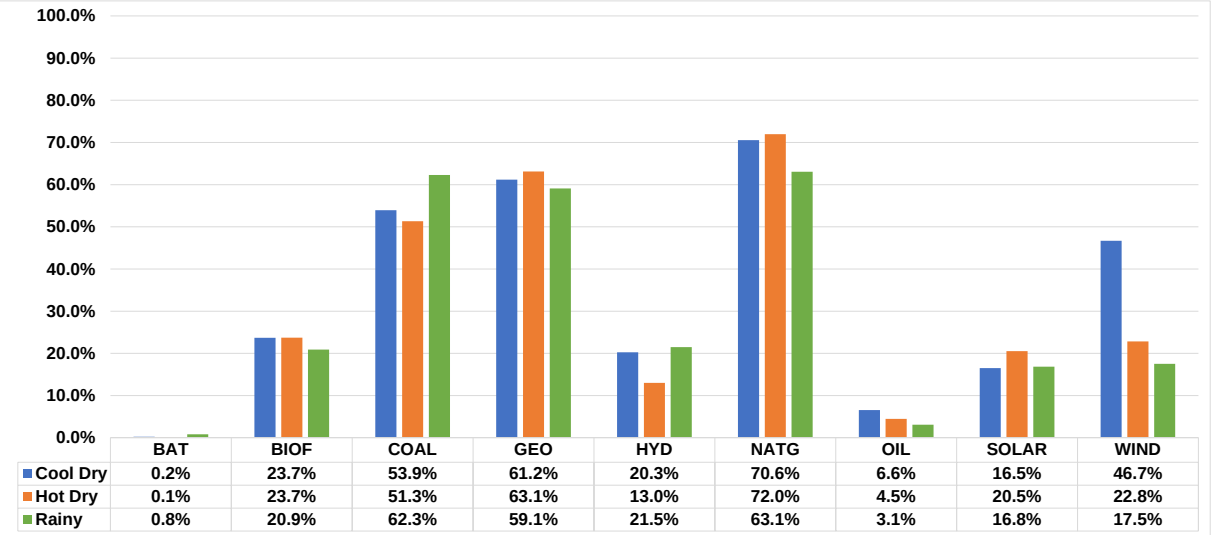


Figure 20. Capacity Mix vs Generation Mix - Luzon, 2020 Seasons

iii. Dispatch Factor[5]

- While only second in rank in terms of capacity and generation mix of the entire grid, natural gas plants posted the highest in terms of dispatch factor all throughout the seasons.
- Geothermal and coal plants had similar dispatch factors of roughly 55-63 percent for each season, indicating more than half of the total capacities being dispatched for the whole billing year.
- Relatively lower dispatch came from hydro plants during the hot dry season in line with the reduction in water supply from rivers and reservoirs in summer to which solar plants, on the other hand, capitalize.
- Wind power plants, similar with last year, consistently showed high dispatch factor during the cool dry season.



	BAT	BIOF	COAL	GEO	HYD	NATG	OIL	SOLAR	WIND
Cool Dry	0.2%	23.7%	53.9%	61.2%	20.3%	70.6%	6.6%	16.5%	46.7%
Hot Dry	0.1%	23.7%	51.3%	63.1%	13.0%	72.0%	4.5%	20.5%	22.8%
Rainy	0.8%	20.9%	62.3%	59.1%	21.5%	63.1%	3.1%	16.8%	17.5%

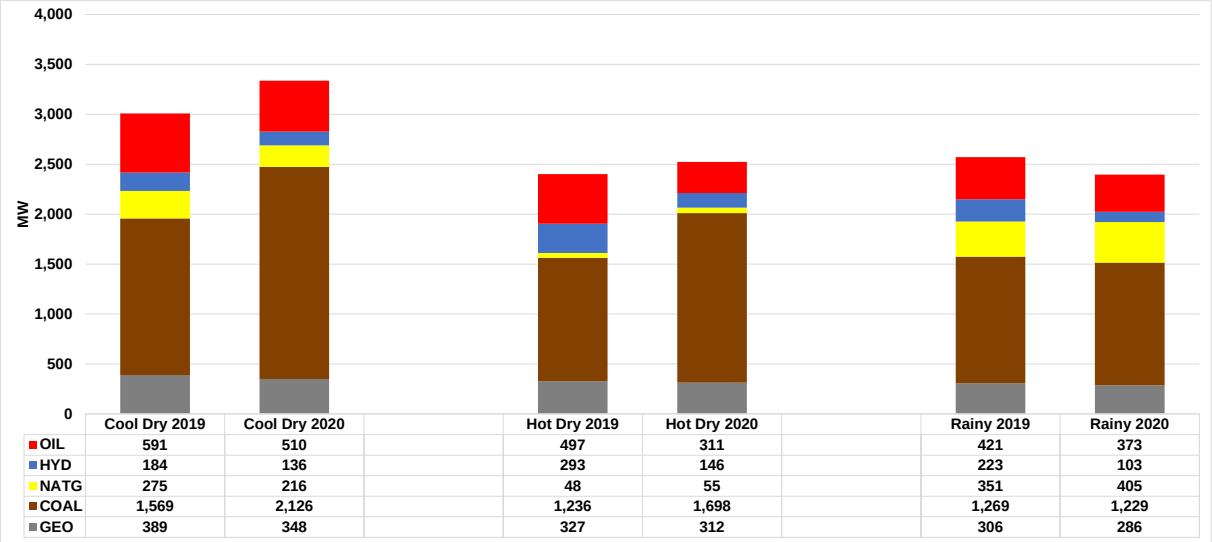
Figure 21. Dispatch Factor by Plant Type, 2020 Seasons

iv. Outage Capacity

- The yearly average outage capacity almost maintained its level with an uptick to 2,654 MW this billing year from 2,638 MW in the previous year.
- Passage of tropical storms drove forced outages to high levels over the course of the year with the onslaught of Typhoon Tisoy rendering several plants on outage in December 2019 and consequently recording the highest monthly and hourly average outage capacity since August 2014.
- Coal plants consistently dominated the outage mix which heavily affected the grid's power supply as coal capacities comprise almost half of the total registered capacity in the market

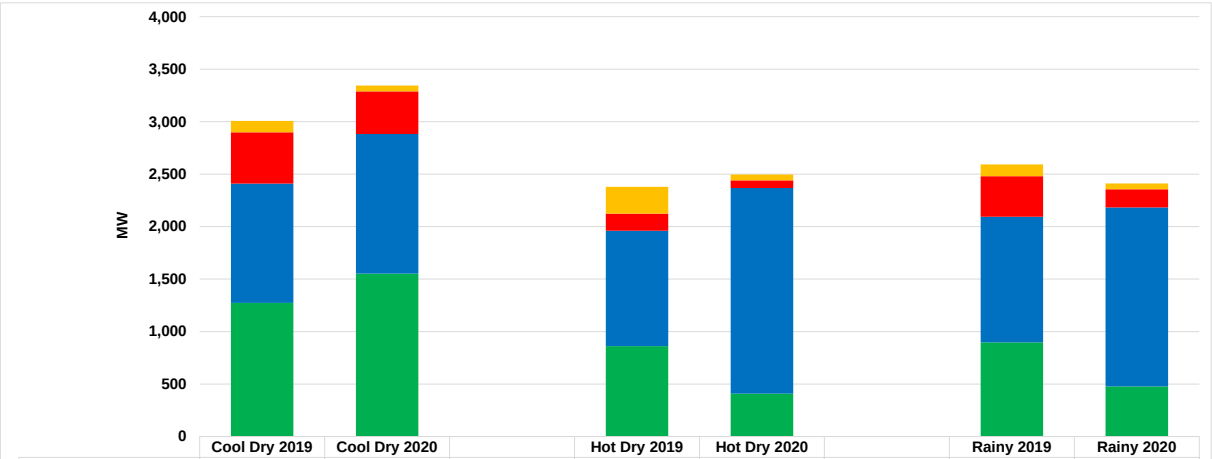
[5] Dispatch factor is the ratio between the total metered quantity and the total registered capacity.

- Even with minimal planned outages during the hot dry season, forced outages remarkably posted a high level.
- On top of high planned outage level every cool dry season, a similar level of forced outages aggravated the total outage capacity, posting the cool dry season the highest outage level for the year.
- Each season recorded the following average hourly level of outage:
    - Cool Dry – 3,343 MW; Hot Dry – 2,494 MW; Rainy – 2,411 MW



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
OIL	591	510	497	311	421	373
HYD	184	136	293	146	223	103
NATG	275	216	48	55	351	405
COAL	1,569	2,126	1,236	1,698	1,269	1,229
GEO	389	348	327	312	306	286

Figure 22. Outage Capacity by Plant Type, 2020 Seasons



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
Deactivated Shutdown	108	55	256	55	112	55
Maintenance Outage	489	407	163	73	386	173
Forced Outage	1,136	1,329	1,100	1,960	1,197	1,704
Planned Outage	1,273	1,553	861	408	897	478

Figure 23. Outage Capacity by Outage Category, 2020 Seasons

- Of the list of major power plants (> 100 MW) with total outage days more than 30 provided below, 20 out of 25 (80 percent) were coal-fired thermal power plants with long durations of forced outages.

- Malaya TPP unit 1 (300 MW) was declared unavailable since May 2019 due to motorization of the generator caused by plant problems
- More than half or 56 percent was from power plants with less than 10 years of age.
- Annex A provides the details of the major plant outages during the whole year.

Table 4. Total Outage Days of Major Power Plants (> 30 days), 2020

Plant/Unit Name	Plant Type	MPG	Capacity (MW)	Age	Total No. of Outage Days			Total
					Forced	Planned	Maintenance	
Malaya 1	OIL	PSALM	300	45	366.0			366.0
Calaca 2	COAL	SMPC	300	36	62.8	3.0	98.0	163.9
SLPGC 1	COAL	SMPC	150	5	87.2		61.4	148.6
SLPGC 2	COAL	SMPC	150	5	31.5	0.4	112.2	144.1
Masinloc 3	COAL	SMC	335	1	131.0		9.4	140.4
Masinloc 1	COAL	SMC	315	22	43.6	13.9	82.6	140.2
San Gabriel	NATG	FGC	420	4	91.0	0.1	26.7	117.8
SMC 4	COAL	SMC	150	2	64.3		27.6	91.9
SMC 3	COAL	SMC	150	3	10.3		76.7	87.1
GN Power 2	COAL	AP	316	7	28.2		56.0	84.2
SLTEC 2	COAL	AC	122.9	5	42.1		39.4	81.5
Pagbilao 1	COAL	AP	382	24	53.9		27.1	81.0
Kalayaan 1	HYD	PSALM	180	38	75.4		2.7	78.2
Sual 2	COAL	SMC	647	21	76.0	1.9		77.9
THVI 2	COAL	AP	169	3	67.8			67.8
SLTEC 1	COAL	AC	121	6	51.6	0.1	13.1	64.9
Sta. Rita 2	NATG	FGC	255.7	20	8.6		51.1	59.7
SBPL	COAL	MGEN	455	1	39.8	13.3		53.0
SMC 1	COAL	SMC	150	4	13.8	38.0		51.9
Pagbilao 2	COAL	AP	382	24	18.2		30.2	48.4
SMC 2	COAL	SMC	150	3	17.5	1.6	27.4	46.6
Masinloc 2	COAL	SMC	344	22	43.9			43.9
QPPL	COAL	QPPL	460	20	7.4		33.5	40.8
Kalayaan 2	HYD	PSALM	180	38	25.0		10.0	35.0
PEDC 3	COAL	GBPC	150	4	31.0			31.0

- Middle-aged generator units (21-50 years) noted long average forced outage days for the year.
- Notwithstanding long duration of outages from middle-aged generator units, average forced outage days of newer plants (1-10 years) also came close at around 32 days or about a month.
- Older generator units (51-80 years) all from hydro plants – Ambuklao HEP, Binga HEP, Angat HEP, and Botocan HEP recorded very short average forced outage days from a range of 0.1 to 1.9 days.

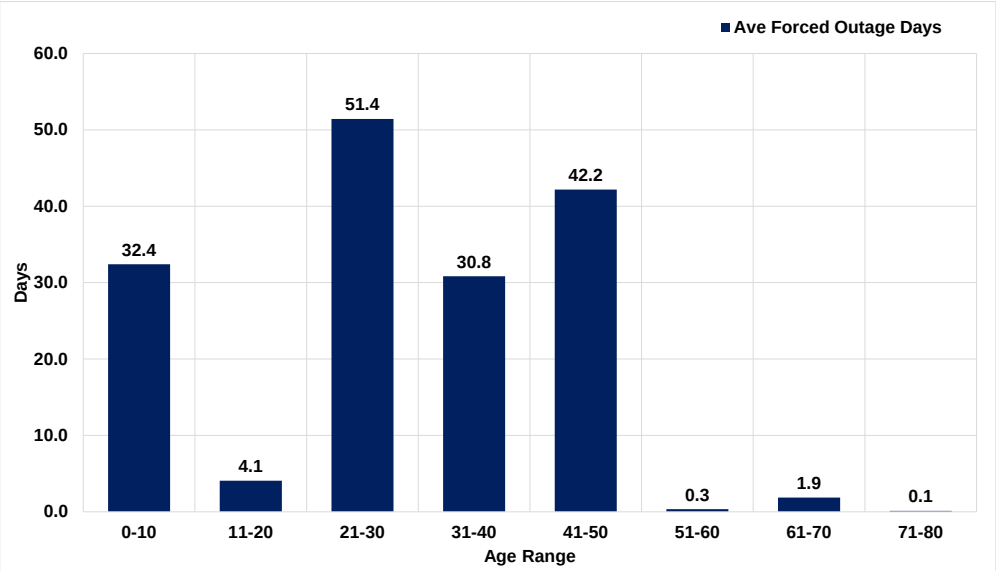


Figure 24. Average Forced Outage Days per Age Range of Generator Units, 2020

- Based on size of plant, large plants (> 100 MW) have longer average forced and planned outage days than small plants (< 100 MW) while the contrary holds for average maintenance outage days.
- Generally, longer duration of outage was observed from large plants.
- Considering all generator outages, the following were arrived at:
    - For every 1 day of maintenance outage, there is approximately 28 days of forced outage.
    - For every 1 day of planned outage, there is approximately 3 days of forced outages.

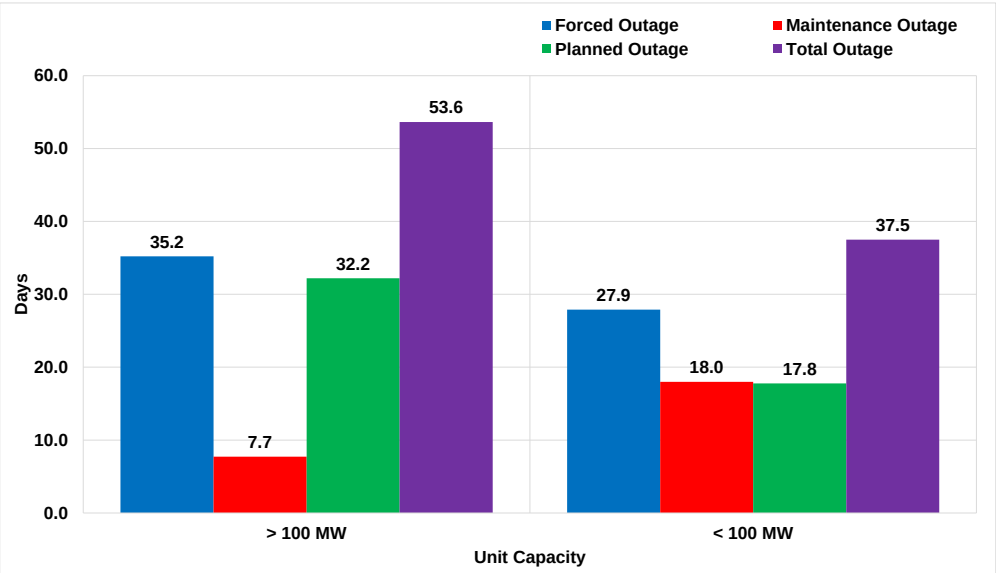


Figure 25. Average Outage Days Based on Unit Capacity, 2020

C. Demand

- The unprecedented decline in the country's economic activities brought about by the pandemic corresponded to a 4.7 percent annual decline in demand from 10,071 MW in 2019 to 9,596 MW in 2020
    - Cool Dry – 5.4 percent increase from 9,037 MW to 9,526 MW; system demand at 12,003 MW on 27 Nov 2019
    - Hot Dry – 12.4 percent decrease from 10,387 MW to 9,094 MW; system demand peaked at 13,162 MW on 10 Mar 2020
    - Rainy – 5.4 percent decrease from 10,439 MW to 9,878 MW; system demand peaked at 12,648 MW on 23 Jun 2020
- Relative to the decline of electricity demand, the Gross Domestic Product (GDP)[6] contracted by 9.5 percent, noting the economic value of a 1 MWh to be PHP172,235/MWh in 2020 from PHP182,651/MWh last year.
- Ironically, the hot dry season recorded the lowest average system demand across all seasons in 2020 as impediments in the business operations translated to a significant downturn in the power demand.
- The system demand gradually recovered during the rainy season in line with the relaxation of quarantine protocols in some parts of the country, but still remained at an unusual low level when compared to last year.

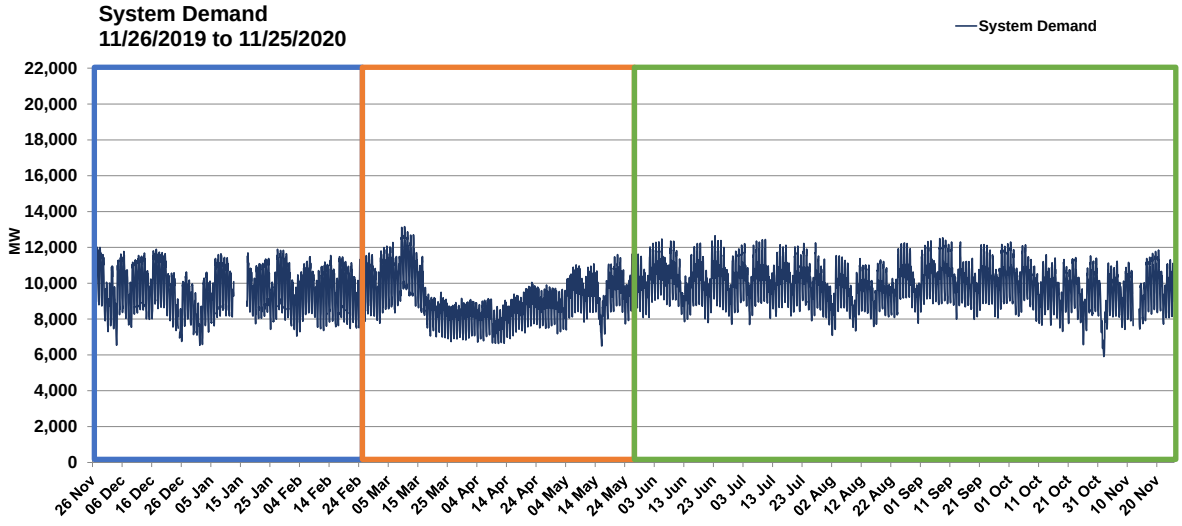
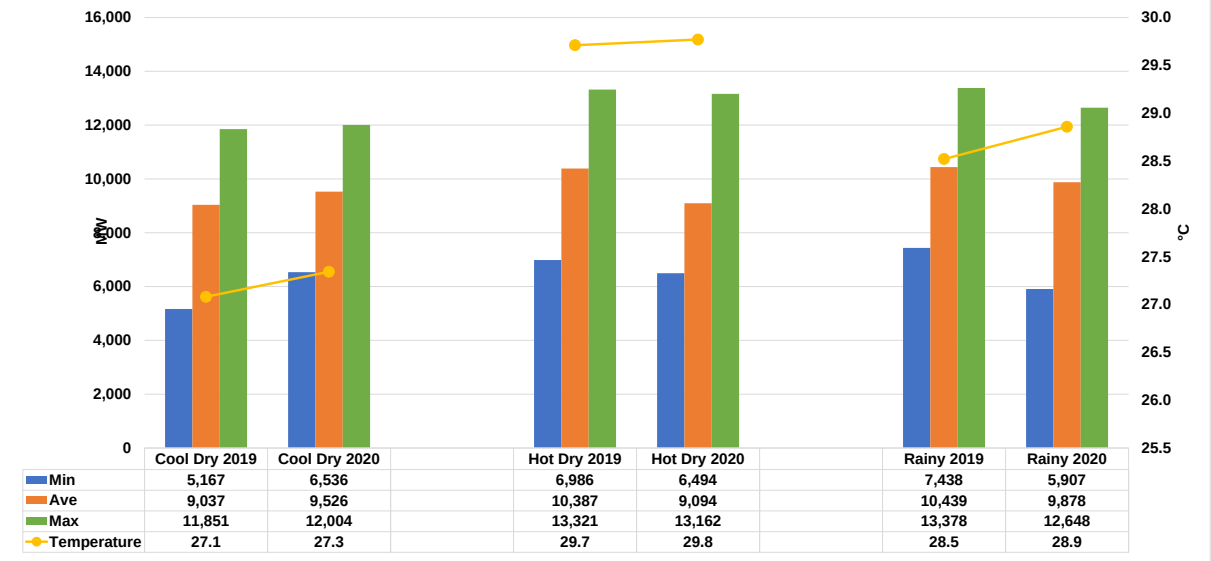


Figure 26. System Demand - Hourly, 2020

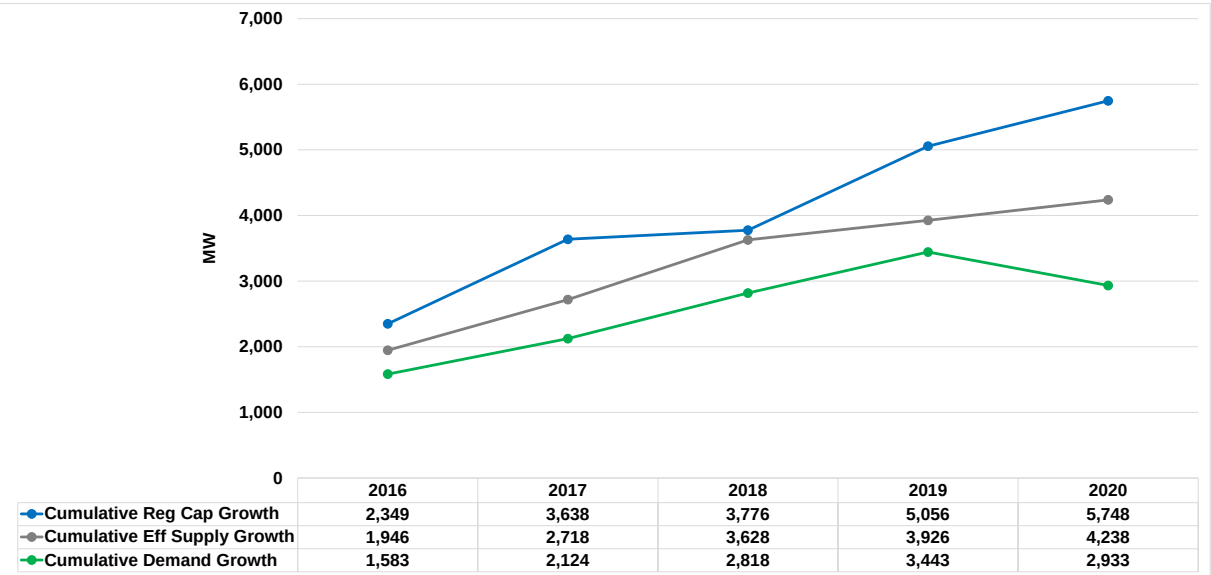
[6] Based on the Philippine Statistics Authority's (PSA) Annual National Accounts Data (2000-2019) at constant 2018 prices as of January 2021



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
Min	5,167	6,536	6,986	6,494	7,438	5,907
Ave	9,037	9,526	10,387	9,094	10,439	9,878
Max	11,851	12,004	13,321	13,162	13,378	12,648
Temperature	27.1	27.3	29.7	29.8	28.5	28.9

Figure 27. Demand and Temperature, 2019 to 2020 Seasons

- Based on additional registered capacities by the end of each year in comparison to the 2015 baseline figures, there is sufficient margin between registered capacity and system demand across the 5-year horizon.
- Effective supply kept up with the increasing demand but observed a relatively reduced growth come 2019 with the higher outages.
- However, the margin further widened by 2020 as the effect of the pandemic inflicted a decay in average demand.



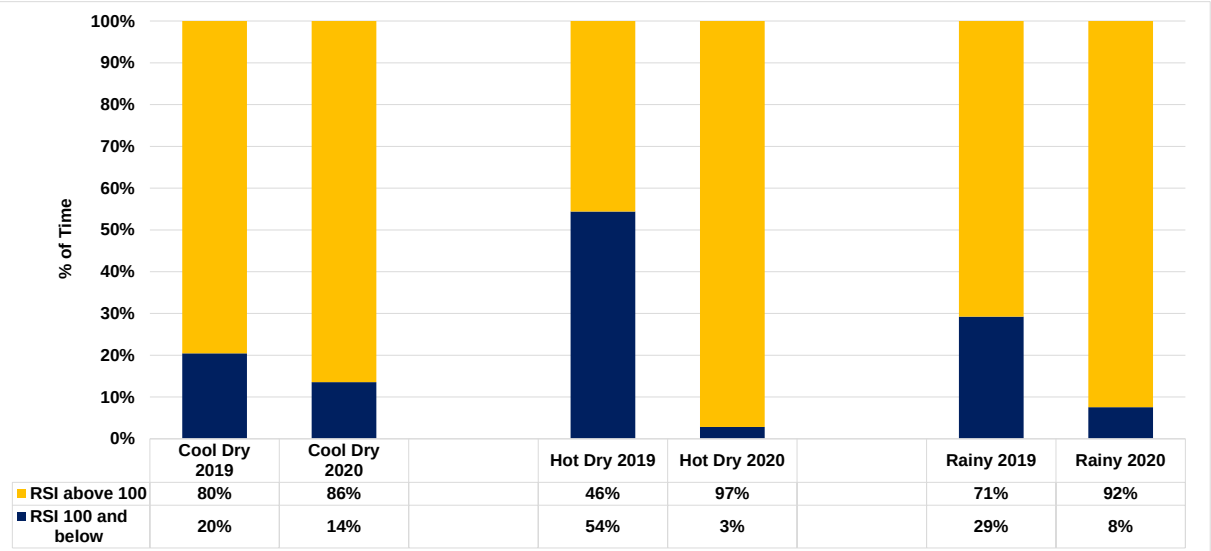
	2016	2017	2018	2019	2020
Cumulative Reg Cap Growth	2,349	3,638	3,776	5,056	5,748
Cumulative Eff Supply Growth	1,946	2,718	3,628	3,926	4,238
Cumulative Demand Growth	1,583	2,124	2,818	3,443	2,933

Figure 28. Cumulative Growth Trend of Supply and Demand, 2016-2020

IV. Competitiveness Analysis

A. Residual Supply Index (RSI)[7]

- A resulting market RSI above 100 indicates sufficient power supply to serve the system demand plus reserve requirement even when the largest generator is unavailable.
- On the other hand, RSIs below 100 pose possibilities of power supply insufficiency which results in identification of pivotal suppliers in the market.
- In 2020, time percentage of RSI above 100 shot up to 97 percent during hot dry season and 92 percent during rainy season, further justifying low market prices during high RSIs for the year at an average of PHP2,183/MWh.
- Low market RSI below 100 averaged at PHP8,816/MWh for the year.



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
RSI above 100	80%	86%	46%	97%	71%	92%
RSI 100 and below	20%	14%	54%	3%	29%	8%

Figure 29. Market RSI, 2019 to 2020 Seasons

B. Pivotal Suppliers and Price Setters above PHP10,000/MWh

- Six (6) plants from Luzon and four (4) plants from Visayas, most of which are oil-based plants, were simultaneously pivotal and price setters above PHP10,000/MWh during the year, indicating that the plants were crucial in satisfying the demand at a particular trading interval. Hence, these plants have market power to turn their high offer prices to market clearing prices.

[7] The Residual Supply Index (RSI) is a dynamic continuous index measured as the ratio of the available generation without that generator to the total generation required to supply the demand. The Market RSI is measured as the lowest RSI among all generators in the market. A Market RSI less than 100% indicates the presence of pivotal generator/s or supplier/s.

- With sufficient supply to address the low demand during the pandemic, the hot dry season had no pivotal suppliers and concurrent price setters above PHP10,000/MWh.

Table 5. Pivotal Supplies and Price Setters above PHP10,000, 2020

Plant	Major Participant Group	Cool Dry		Hot Dry		Rainy	
		Frequency	% of Time	Frequency	% of Time	Frequency	% of Time
LIMAY CCGT	MEI	4	0.18%			6	0.14%
SAN ROQUE HEP	SMC	7	0.32%			2	0.05%
BAUANG DPP	VEC	3	0.14%			6	0.14%
CALUMANGAN DPP	Other IPPs					4	0.09%
PPC DPP	GBPC					3	0.07%
BATANGAS DPP	Other IPPs					1	0.02%
PANAY DPP III	SPC					1	0.02%
PANAY DPP I	SPC					1	0.02%
ANDA CFTPP	APC					1	0.02%
KALAYAAN PSPP	PSALM					1	0.02%

C. Market Share and Herfindahl-Hirschman Index (HHI)[8]

- Across all seasons, the WESM remained to be dominated by four (4) major participant groups based on registered capacity: San Miguel Corporation (SMC), Aboitiz Power Corporation (AP), First Gen Corporation (FGC), and Power Sector Assets and Liabilities Management Corporation (PSALM).
- The combined shares of all four major firms comprised almost three quarters of the system's capacity mix.

[8] The HHI measures the degree of market concentration, considering the relative size and distribution of participants in the monitored market. It is calculated as the sum of squares of the participant's market share. The following are the widely used HHI screening numbers: the HHI approaches zero when the market has very large number of participants with each having a relatively small market share. In contrary, the HHI increases as the number of participants in the market decreases, and the disparity in the market shares among the participants increases. The following are the widely-used HHI screening numbers: (1) when HHI is less than 1,000 the market is not concentrated; (2) in the range of 1,000 to 1,800 the market is moderately concentrated; (3) greater than 1,800 to 2,500 the market is concentrated; and (4) greater than 2,500 the market is highly concentrated and signals lack of competition in the market.

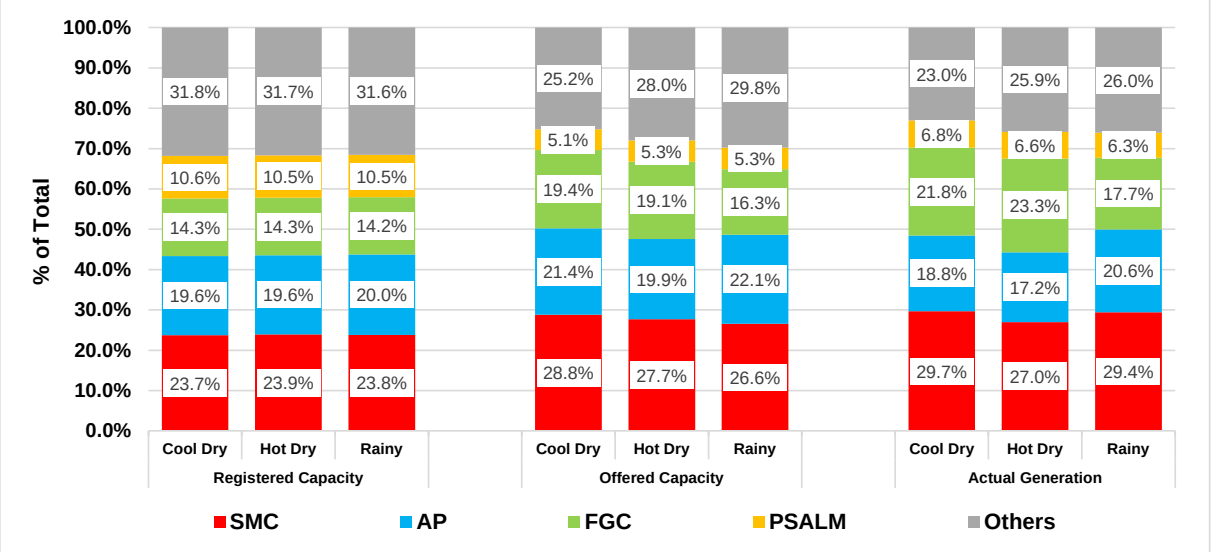


Figure 30. Market Share, 2020 Seasons

- Correspondingly, the hourly HHIs indicated a moderately concentrated market based on registered capacities for all hours in 2020.
- Instances of a concentrated market resulted when measured in terms of offered capacity and actual generation which signaled a deviation from an ideal market.

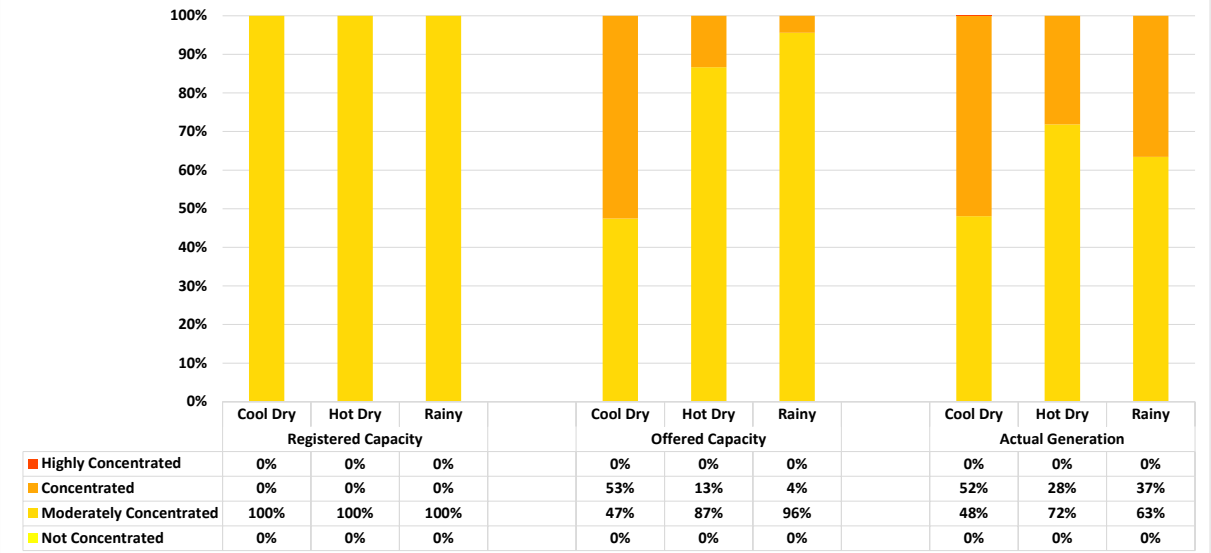


Figure 31. Herfindahl-Hirschman Index, 2020 Seasons

V. Generator Trading Behavior

- Difference Calculation[9] represents the measure of magnitude of increase or decrease in price offer of a generator, a major participant group (by portfolio), or by plant type.
- In this report, the Average Reference Price (ARP) refers to a plant type's capacity-weighted average offer price (in PHP/MWh) in the previous year, while the Average Subject Price (ASP) employs the same methodology but for the current year.
- All contestable quantities of each plant type are utilized since non-contestable quantities (i.e. Pmin, must dispatch, priority dispatch, and non-scheduled) are not competitively offered in the market.
- Consistent with last year, geothermal plants were the cheapest of all resource types offering all its capacities in the market at an average below PHP0/MWh for the year.
- On the contrary, oil-based plants were the most expensive to supply power to the grid due to higher fuel costs.
- Given the high reliance of the grid from relatively cheaper coal and natural gas plants, both plant types averaged at an offer price below PHP2,000/MWh.
- Bid splitting resembles an offer strategy when a generating unit sections its offer capacities with considerable price differences.
- For the duration of the year, a total of 15 generator units (10 in Luzon and 5 in Visayas) exhibited a bid splitting behavior:
    - 4 coal plants, 3 hydro plants, 6 oil-based plants, and 2 geothermal plants

Table 6. Average Offer Prices Based on Plant Type, 2019 and 2020 Seasons

Plant Type	Cool Dry			Hot Dry			Rainy		
	ARP	ASP	% Diff	ARP	ASP	% Diff	ARP	ASP	% Diff
Battery	17,201	17,100	-1%	17,100	17,100	No Change	17,100	17,100	No Change
Coal	1,843	966	-48%	841	1,310	56%	1,567	140	-91%
Geothermal	-104	-583	-460%	-53	-604	-1050%	-186	-465	-149%
Hydro	8,943	9,633	8%	9,024	12,833	42%	7,087	9,790	38%
Natural Gas	576	1,097	91%	-162	477	394%	820	377	-54%
Oil	21,361	18,288	-14%	17,940	22,455	25%	18,217	21,766	19%

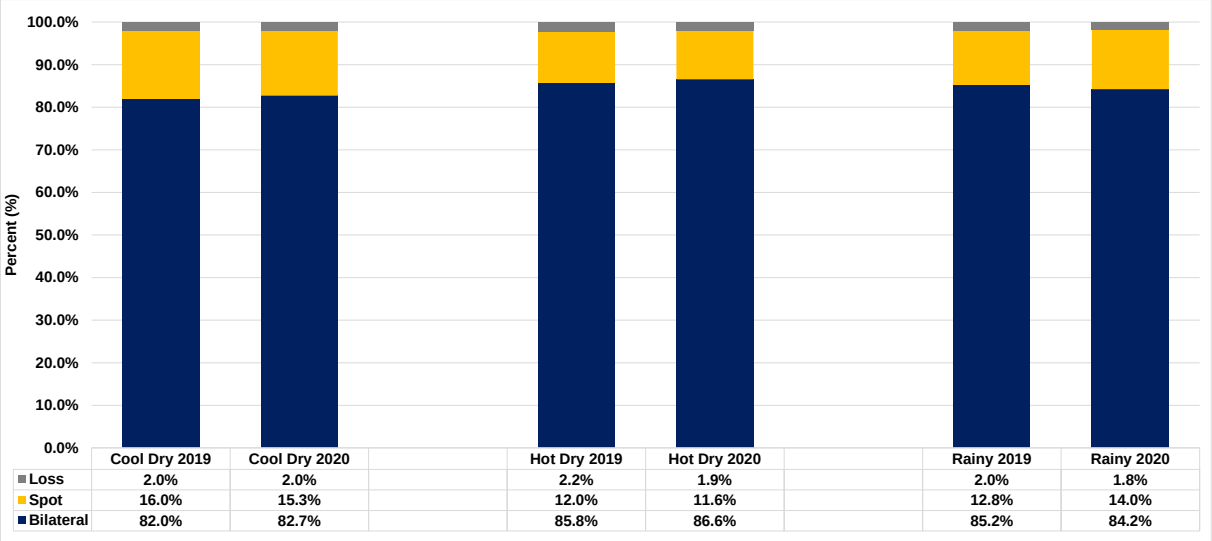
VI. Spot Market Transactions

A. Spot Exposure

- Total energy transactions (in MWh) declined by 5 percent following the depressed demand, but the seasonal composition of spot and bilateral contract quantities remained almost relatively unchanged.
- The spot market transaction of trading participants during the year stood at 14 percent, an uptick from last year's 13 percent.

[9] The methodology of the Offer Pattern Analysis, which is comprised of two parts: Difference Calculation and Outlier Detection, was adopted by the Market Surveillance Committee to easily quantify the offers in the WESM and to evaluate the change in offers if the same is within or outside the set reference levels which was based on historical data of each generator.

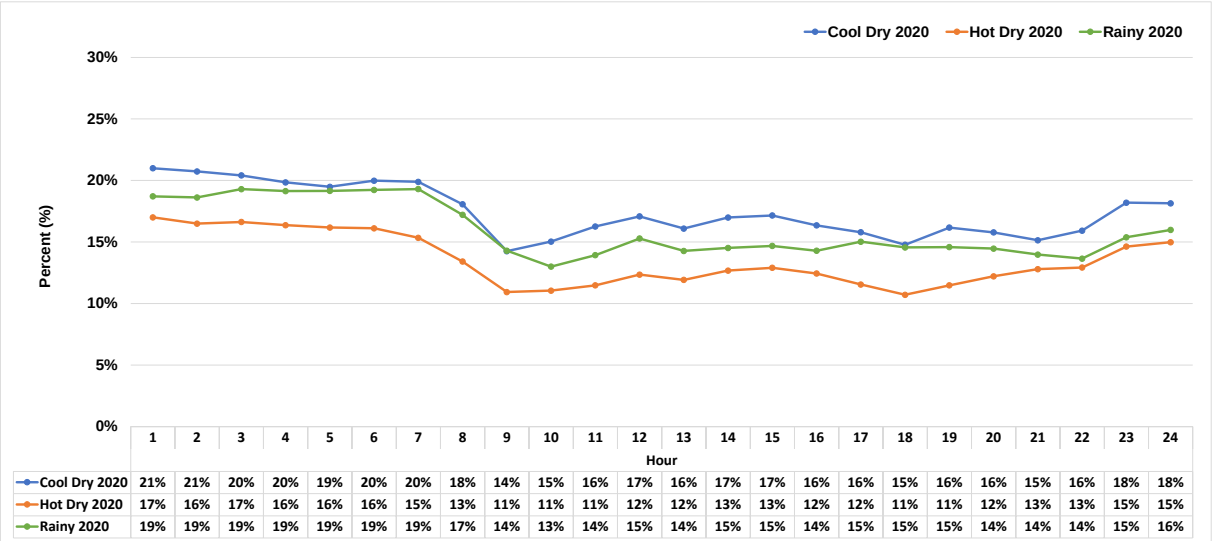
- Consequently, majority of the energy transactions in the grid are still entered into by bilateral contracts.



	Cool Dry 2019	Cool Dry 2020	Hot Dry 2019	Hot Dry 2020	Rainy 2019	Rainy 2020
Loss	2.0%	2.0%	2.2%	1.9%	2.0%	1.8%
Spot	16.0%	15.3%	12.0%	11.6%	12.8%	14.0%
Bilateral	82.0%	82.7%	85.8%	86.6%	85.2%	84.2%

Figure 32. Spot Market Exposure, 2019 to 2020 Seasons

- Spot exposure is lower in peak hours, indicating that consumers are more covered by bilateral contracts which reduce the risk of exposure in volatile prices during peak hours.
- The hot dry season posted the lowest spot exposure across all hours despite having low prices this year.



Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Cool Dry 2020	21%	21%	20%	20%	19%	20%	20%	18%	14%	15%	16%	17%	16%	17%	17%	16%	16%	15%	16%	16%	15%	16%	18%	18%
Hot Dry 2020	17%	16%	17%	16%	16%	16%	15%	13%	11%	11%	11%	12%	12%	13%	13%	12%	12%	11%	11%	12%	13%	13%	15%	15%
Rainy 2020	19%	19%	19%	19%	19%	19%	19%	17%	14%	13%	14%	15%	14%	15%	15%	14%	15%	15%	15%	14%	14%	14%	15%	16%

Figure 33. Hourly Generator Spot Market Exposure, 2020 Seasons

B. Total Trading Amount (TTA)[10] Share

- PSALM held the top spot in terms of TTA at a high 20 percent share with a corresponding 19 percent spot exposure despite being fourth in terms of overall registered capacity.
- Similarly, Semirara Mining and Power Corporation (SMPC) ended incurred high TTAs percentage despite having a low share in registered capacity as most of the capacities were sold in the market.
- On the other hand, San Miguel Corporation (SMC) and Aboitiz Power Corporation (AP) recorded high actual generation percentages, but effectively had lower spot exposures which led to low TTA shares.
- Millennium Energy, Inc. (MEI) had only 1 percent of actual generation share but resulted in a 9 percent TTA share given that the portfolio consists of relatively more expensive oil-based plants.

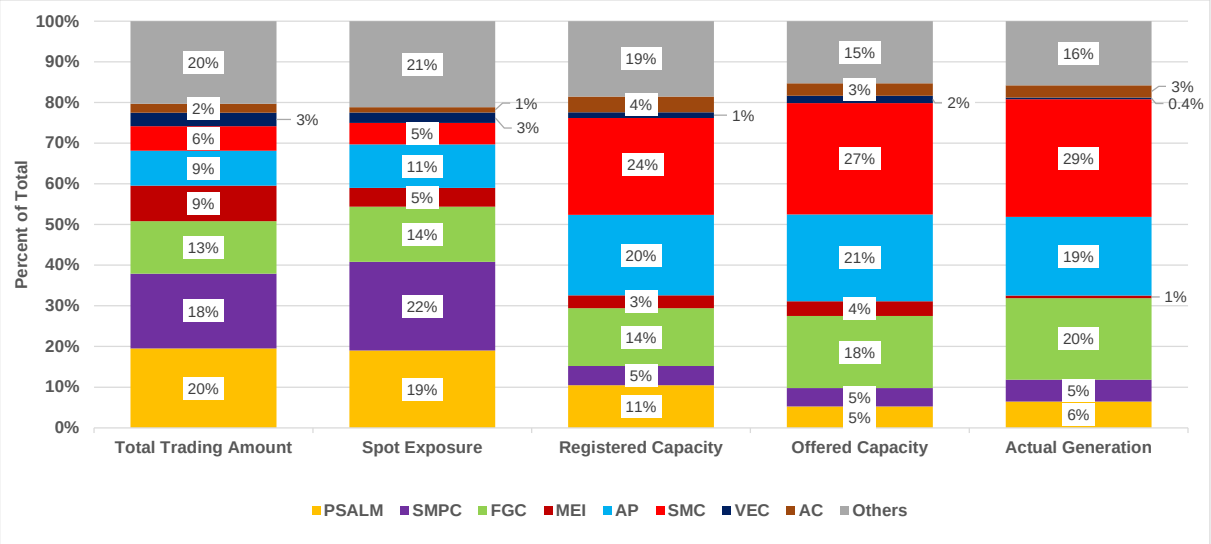


Figure 34. Total Trading Amount and Spot Exposure, 2020

VII. Compliance Monitoring

- Provided in the table is the breakdown of the registered capacity based on the Compliance Monitoring and Assessment of PEMC – Enforcement and Compliance Office.
- In summary, power plants registered a 69 percent compliance to the Must Offer Rule in the spot market.

[10] The Total Trading Amount refers to the amount of revenue from spot market transactions excluding quantities that are declared by the generators as covered by bilateral power supply contracts, which are settled outside the WESM. The TTA share of a major participant group is measured as a percentage of its TTA over the TTA of all participants during the period.

- Most of the justified reasons resulted from outages of plants at 9 percent of the total capacities.
- Justified reasons arising from resource constraints closely followed and accounted 7 percent of the capacities. It can also be seen that this was more evident in renewable resource facilities as these were subject to the intermittency of the fuel sources.
- Meanwhile, a low 0.2 percent of the capacities provided reasons which were not justified and will be further investigated based on PEMC-ECO's evaluation.

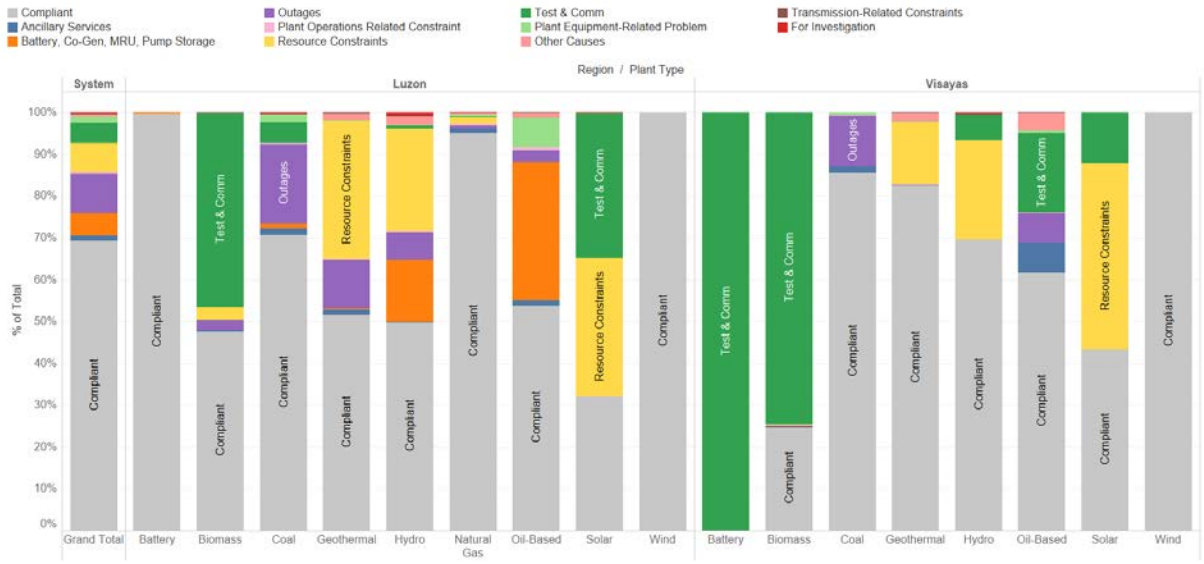


Figure 35. Compliance Monitoring of Plant Capacities per Resource Type, 2020

Annex A. Major Plant Outages

Region	Plant Type	Plant/ Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Outage Type	Remarks	Date Commissioned/ Commerical Operation
LUZON	OIL	Malaya 1	300	05/03/2019 18:21			Forced Outage	Motorization of unit generator caused by the non-opening of phase B of PCB 8-05CB08M	Aug 1975
LUZON	COAL	Calaca 2	300	10/17/2019 23:49	03/03/2020 0:01	137.01	Planned Outage	Maintenance Outage until 02 March 2020	Sep 1984
LUZON	COAL	SMC 2	150	12/06/2019 2:15	01/02/2020 12:13	27.42	Planned Outage	Planned Outage until 20 December 2019.(GOP)	Mar 2017
LUZON	OIL	Malaya 2	350	12/13/2019 0:01	12/31/2019 16:01	18.67	Maintenance Outage	Maintenance outage until 31 December 2019	Apr 1979
LUZON	COAL	SLPGC 1	150	12/13/2019 0:04	02/12/2020 10:14	61.42	Planned Outage	Maintenance Outage	Jan 2015
LUZON	COAL	Masinloc 1	315	12/19/2019 23:53	01/02/2020 22:01	13.92	Maintenance Outage	Maintenance outage until December 24 2019	Jun 1998
LUZON	COAL	SBPL	455	12/25/2019 19:36	12/26/2019 4:33	0.37	Forced Outage	Manually tripped due to Air Heater Trouble	Apr 2019
LUZON	COAL	Masinloc 3	335	12/28/2019 16:02	01/03/2020 19:23	6.14	Forced Outage	Tripped at 125MW load. On commissioning Test.	Mar 2019
LUZON	NATG	San Gabriel	420	12/29/2019 14:27	12/29/2019 17:35	0.13	Maintenance Outage	To facilitate changeover of gas supply.	Mar 2016
VISAYAS	COAL	PEDC 3	150	12/31/2019 19:35	01/29/2020 22:58	29.14	Forced Outage	Coal feeder A and B problem. Scheduled for APMS at 2001H	Aug 2016
LUZON	COAL	Masinloc 2	344	01/02/2020 10:24	01/02/2020 20:59	0.44	Forced Outage	Tripped at 160MW load. System frequency is 59.55hz.	Jun 1998
LUZON	COAL	GN Power 1	316	01/02/2020 12:07	01/03/2020 4:22	0.68	Forced Outage	Excessive Oil Leak at Governor Valve	May 2013
LUZON	COAL	Masinloc 2	344	01/02/2020 21:29	01/03/2020 7:07	0.40	Forced Outage	Turbine protection actuated.	Jun 1998
LUZON	COAL	SMC 1	150	01/03/2020 4:27	02/06/2020 18:40	34.59	Maintenance Outage	Maintenance Outage until 22 January 2020.	Nov 2016
LUZON	COAL	Masinloc 2	344	01/03/2020 7:22	01/03/2020 12:15	0.20	Forced Outage	Turbine protection actuated	Jun 1998
LUZON	COAL	Masinloc 3	335	01/03/2020 19:49	01/04/2020 17:08	0.89	Forced Outage	Rotor earth fault tripped.	Mar 2019
LUZON	NATG	Sta. Rita 1	257.3	01/04/2020 0:29	01/05/2020 22:28	1.92	Planned Outage	Planned Outage until 07 January 2020.	Jun 2000
LUZON	NATG	San Gabriel	420	01/04/2020 0:48	01/24/2020 23:13	20.93	Planned Outage	Planned Outage until 18 January 2020.	Mar 2016
LUZON	COAL	GN Power 2	316	01/07/2020 0:12	03/03/2020 0:01	55.99	Planned Outage	Planned Outage until 23 February 2020	May 2013
LUZON	COAL	QPPL	460	01/07/2020 9:01	01/08/2020 0:22	0.64	Forced Outage	High Pressure Heater 6 tube leak	May 2000
LUZON	NATG	Sta. Rita 3	265.5	01/11/2020 0:22	01/12/2020 23:50	1.98	Planned Outage	Maintenance Outage until 12 January 2020	Oct 2001
LUZON	COAL	Masinloc 2	344	01/12/2020 2:25	01/13/2020 7:39	1.22	Forced Outage	DCS failure.	Jun 1998
LUZON	COAL	Sual 1	647	01/15/2020 7:20	01/16/2020 14:57	1.32	Forced Outage	Emergency tripped due to Boiler tube leak.Lowest frequency is 58.856Hz	Oct 1999
LUZON	COAL	Sual 1	647	01/17/2020 0:57	01/21/2020 14:12	4.55	Forced Outage	Emergency shutdown due to condenser tube leak	Oct 1999
LUZON	COAL	SMC 2	150	01/17/2020 14:57	01/17/2020 17:35	0.11	Forced Outage	Failure of main oil pump	Mar 2017
LUZON	COAL	QPPL	460	01/17/2020 23:58	02/20/2020 10:55	33.46	Planned Outage	Planned outage as per GOP	May 2000
LUZON	NATG	Sta. Rita 4	264	01/18/2020 0:19	01/20/2020 1:56	2.07	Planned Outage	Planned outage.	Oct 2001
LUZON	COAL	SMC 2	150	01/19/2020 12:57	01/25/2020 15:51	6.12	Forced Outage	Boiler Tube Leak.	Mar 2017
LUZON	NATG	Sta. Rita 4	264	01/20/2020 2:26	01/20/2020 5:09	0.11	Forced Outage	Tripped with 60MW load.	Oct 2001
LUZON	COAL	Calaca 1	300	01/24/2020 15:29	01/25/2020 6:28	0.62	Forced Outage	Isolated due to tripping of Calaca-Sta Rita 230kV L1	Sep 1984
LUZON	COAL	SLPGC 2	150	01/24/2020 15:29	01/28/2020 15:55	4.02	Forced Outage	Isolated due to tripping of Calaca-Sta Rita 230kV L1	Jan 2015
LUZON	COAL	SBPL	455	01/24/2020 20:27	01/25/2020 8:46	0.51	Forced Outage	Emergency tripped due to air heater trouble.	Apr 2019
LUZON	NATG	Sta. Rita 1	257.3	01/25/2020 1:43	01/26/2020 8:25	1.28	Forced Outage	Initiated by First Gas in coordination with SO to maintain N-1 compliannce for Batangas-	Jun 2000
LUZON	COAL	SBPL	455	01/25/2020 11:26	01/26/2020 21:42	1.43	Forced Outage	Air heater problem	Apr 2019
LUZON	NATG	San Gabriel	420	01/25/2020 20:33	01/25/2020 23:20	0.12	Forced Outage	Tripped with 410MW load.	Mar 2016
LUZON	COAL	SBPL	455	01/26/2020 23:30	01/27/2020 1:55	0.10	Forced Outage	Tripped with 80MW load.	Apr 2019
LUZON	COAL	SBPL	455	01/27/2020 20:48	02/16/2020 19:39	19.95	Forced Outage	Boiler de-slagging	Apr 2019
LUZON	NATG	Sta. Rita 3	265.5	01/31/2020 11:35	01/31/2020 13:08	0.06	Forced Outage	Tripped at 265MW load	Oct 2001
LUZON	NATG	San Gabriel	420	02/02/2020 17:01	02/03/2020 1:01	0.33	Forced Outage	Boiler protection actuated	Mar 2016
LUZON	COAL	Masinloc 2	344	02/07/2020 23:46	02/11/2020 10:58	3.47	Forced Outage	Due to boiler tube leak.	Jun 1998
LUZON	COAL	SMC 2	150	02/07/2020 23:46	02/09/2020 14:06	1.60	Maintenance Outage	MO from 02.8-9.2020.	Mar 2017
LUZON	COAL	GN Power 1	316	02/09/2020 7:35	02/13/2020 0:43	3.71	Forced Outage	Emergency shutdown due to turbine driven circulating valve repair.	May 2013
LUZON	COAL	SMC 4	150	02/10/2020 23:25	03/09/2020 14:15	27.62	Planned Outage	Maintenance outage until 02 March 2020	Sep 2018
LUZON	COAL	SLPGC 1	150	02/12/2020 14:14	02/12/2020 18:09	0.16	Forced Outage	From MO (over speed testing).	Jan 2015
LUZON	HYD	Kalayaan 1	180	02/13/2020 23:01	03/06/2020 23:11	22.01	Forced Outage	Declared unavailable due to heavy water leak at penstock	Aug 1982
LUZON	HYD	Kalayaan 2	180	02/13/2020 23:01	03/06/2020 21:05	21.92	Forced Outage	Declared unavailable due to heavy water leak at penstock	Aug 1982
LUZON	HYD	Kalayaan 3	180	02/14/2020 3:17	02/14/2020 4:45	0.06	Forced Outage	Tripped as pump.	May 2004
LUZON	HYD	Kalayaan 3	180	02/14/2020 18:50	02/14/2020 20:53	0.09	Forced Outage	Turbine guide bearing trouble	May 2004
LUZON	COAL	Masinloc 3	335	02/14/2020 23:36	02/24/2020 9:03	9.39	Planned Outage	Tripped while on house load operation started at 2334H.	Mar 2019
LUZON	COAL	Sual 1	647	02/14/2020 23:58	02/16/2020 14:20	1.60	Maintenance Outage	Maintenance Outage until 2-16-2020 at 2400H.(RECLASSIFIED FROM FORCE. OMC OUTA	Oct 1999
LUZON	NATG	Sta. Rita 1	257.3	02/15/2020 0:53	02/23/2020 3:29	8.11	Maintenance Outage	On Maintenance Outage	Jun 2000
LUZON	HYD	Kalayaan 3	180	02/15/2020 1:22	02/21/2020 15:26	6.59	Forced Outage	On emergency shutdown due to Tubine bearing temp. high.	May 2004
LUZON	HYD	Kalayaan 4	180	02/15/2020 1:23	02/15/2020 8:50	0.31	Forced Outage	Affected by the tripping of San Juan - Lumban 230kV Lines 1 and 2 (isolated)	May 2004
LUZON	COAL	SLPGC 2	150	02/19/2020 23:57	06/11/2020 4:23	112.18	Planned Outage	Maintenance outage.	Jan 2015
LUZON	COAL	Pagbilao 1	382	02/20/2020 19:31	02/26/2020 23:07	6.15	Forced Outage	Tripped off due to Boiler tube leak.	Mar 1996
LUZON	COAL	Sual 2	647	02/21/2020 23:34	02/23/2020 11:19	1.49	Maintenance Outage	Maintenance Outage until 26 February 2020	Oct 1999
LUZON	COAL	Masinloc 3	335	02/24/2020 13:28	02/25/2020 21:43	1.34	Forced Outage	Tripped with 107MW load. On commissioning test	Mar 2019
LUZON	COAL	SMC 2	150	02/25/2020 12:41	02/26/2020 1:49	0.55	Forced Outage	Emergency shutdown to rectify the observed hotspot on the connectors of SCPC Unit 2	Mar 2017
LUZON	COAL	Sual 1	647	02/26/2020 3:03	02/26/2020 13:27	0.43	Forced Outage	Tripped at 343MW load. System Frequency at 59.28hz	Oct 1999
LUZON	COAL	QPPL	460	02/28/2020 3:33	03/01/2020 21:54	2.76	Forced Outage	Initial report-- air heater problem	May 2000
VISAYAS	COAL	THVI 2	169	02/28/2020 5:30	02/29/2020 10:07	1.19	Forced Outage	AFFECTED BY TRIPPING OF 230KV THVI-MAGDUGO LINE 2	Dec 2017
LUZON	COAL	GN Power 1	316	02/29/2020 0:16	03/01/2020 10:06	1.41	Forced Outage	Emergency shutdown due to Steam leak at main steam line going to MSV 2	May 2013
LUZON	COAL	QPPL	460	03/02/2020 2:41	03/04/2020 3:50	2.05	Forced Outage	Suspected tube leak at economizer and feed water trouble	May 2000
LUZON	NATG	Ilijan A1	190	03/02/2020 23:57	03/03/2020 18:25	0.77	Forced Outage	Tripping of boiler feed pump	Jun 2002
LUZON	NATG	Ilijan A2	190	03/02/2020 23:57	03/03/2020 21:28	0.90	Forced Outage	Tripping of boiler feed pump	Jun 2002
LUZON	NATG	Ilijan A3	220	03/02/2020 23:57	03/03/2020 20:06	0.84	Forced Outage	Tripping of boiler feed pump	Jun 2002
LUZON	COAL	GN Power 2	316	03/03/2020 0:02	03/04/2020 16:04	1.67	Forced Outage	Planned Outage. Extended outage from 23 February 2020 to 05 March 2020	May 2013
LUZON	COAL	Calaca 2	300	03/03/2020 0:02	03/25/2020 19:31	22.81	Forced Outage	Maintenance Outage. Extended shutdown from 03 March 2020 to 11 March 2020	Sep 1984
LUZON	NATG	Ilijan B1	190	03/03/2020 11:23	03/03/2020 16:09	0.20	Forced Outage	Blade path temperature large variation trip	Jun 2002
LUZON	NATG	Ilijan B1	190	03/03/2020 21:34	03/05/2020 11:44	1.59	Forced Outage	Tripped due to Gas Turbine Trouble	Jun 2002
LUZON	NATG	Ilijan B3	220	03/04/2020 5:38	03/04/2020 13:08	0.31	Forced Outage	Emergency shutdown to facilitate inspection of GT2-1 CT and PT connection	Jun 2002
LUZON	NATG	Ilijan B2	190	03/04/2020 5:49	03/04/2020 11:59	0.26	Forced Outage	Emergency shutdown to facilitate inspection of GT2-1 CT and PT connection	Jun 2002
LUZON	NATG	Ilijan B1	190	03/05/2020 12:14	03/05/2020 14:04	0.08	Forced Outage	Control steam valve problem.	Jun 2002
LUZON	NATG	Ilijan B1	190	03/06/2020 15:21	03/06/2020 18:35	0.13	Forced Outage	Fuel gas valve problem.	Jun 2002
LUZON	HYD	Kalayaan 3	180	03/07/2020 8:45	03/07/2020 9:17	0.02	Forced Outage	Thrust Bearing trouble	May 2004
LUZON	NATG	Ilijan B1	190	03/07/2020 15:57	03/08/2020 4:22	0.52	Forced Outage	Tripped at 126MW. Initial cause of tripping is the fluctuation of fuel gas main control val	Jun 2002
LUZON	COAL	SMC 3	150	03/10/2020 23:35	05/26/2020 16:56	76.72	Planned Outage	Maintenance outage.	Nov 2017
LUZON	COAL	Masinloc 1	315	03/12/2020 15:53	03/16/2020 14:20	3.94	Forced Outage	Boiler tubeleak.	Jun 1998
LUZON	COAL	SMC 4	150	03/19/2020 23:07	05/17/2020 16:39	58.73	Forced Outage	Repair of ESP Transformer	Sep 2018
LUZON	COAL	GN Power 2	316	03/21/2020 0:14	03/26/2020 4:07	5.16	Forced Outage	Emergency Shutdown to perform Trim Balancing of LP Turbine	May 2013
LUZON	COAL	SMC 1	150	03/21/2020 9:27	03/21/2020 10:59	0.06	Forced Outage	Steam drum level low.	Nov 2016
LUZON	COAL	SMC 1	150	03/21/2020 11:06	03/21/2020 14:45	0.15	Forced Outage	High reheater temperature.	Nov 2016
VISAYAS	COAL	PEDC 3	150	03/23/2020 15:16	03/23/2020 16:17	0.04	Forced Outage	Internal trouble	Aug 2016
VISAYAS	COAL	THVI 2	169	03/23/2020 15:54	04/19/2020 18:30	27.11	Forced Outage	EMERGENCY CUT-OUT. TO CONDUCT INSPECTION OF ALL COAL CILO	Dec 2017
LUZON	COAL	SLPGC 1	150	03/23/2020 17:44	04/30/2020 11:09	37.73	Forced Outage	Tripped due to boiler tube leak	Jan 2015
LUZON	COAL	Masinloc 3	335	03/24/2020 0:34	07/20/2020 8:42	118.34	Forced Outage	To facilitate repair on HP heater and Induced draft fan. On commissioning test	Mar 2019
LUZON	NATG	Sta. Rita 3	265.5	03/24/2020 1:39	03/24/2020 12:01	0.43	Forced Outage	Generator unit protection tripped	Oct 2001
LUZON	NATG	Sta. Rita 3	265.5	03/26/2020 0:35	03/26/2020 3:47	0.13	Maintenance Outage	Generator Module card control system repair	Oct 2001
LUZON	COAL	GN Power 2	316	03/26/2020 4:09	03/26/2020 12:28	0.35	Forced Outage	Tripped at 12MW load.	May 2013
LUZON	COAL	Calaca 2	300	03/27/2020 19:40	03/27/2020 23:05	0.14	Forced Outage	High turbine vibration	Sep 1984
LUZON	COAL	Calaca 2	300	03/28/2020 2:21	03/28/2020 5:52	0.15	Forced Outage	Main stop valve leak.	Sep 1984
LUZON	COAL	Masinloc 2	344	03/28/2020 17:41	03/29/2020 8:59	0.64	Forced Outage	Master Fuel Control System trouble.	Jun 1998
LUZON	NATG	Sta. Rita 3	265.5	03/29/2020 7:43	03/30/2020 1:15	0.73	Maintenance Outage	Compressor Washing	Oct 2001
LUZON	COAL	Masinloc 2	344	03/29/2020 9:27	04/27/2020 18:24	29.37	Forced Outage	Tripped at 70MW load. Turbine protection actuated	Jun 1998
LUZON	COAL	GN Power 2	316	04/03/2020 19:22	04/07/2020 12:34	3.72	Forced Outage	Induce Draft Fan - A inlet vane problem.	May 2013
LUZON	COAL	QPPL	460	04/08/2020 9:47	04/10/2020 7:29	1.90	Forced Outage	Primary Air Heater expansion bellow trouble.	May 2000
LUZON	NATG	Sta. Rita 2	255.7	04/09/2020 4:52	04/10/2020 16:44	1.49	Forced Outage	Rectification of GT fuel Gas control valve.	Jun 2000
LUZON	COAL	Calaca 2	300	04/09/2020 16:38	04/12/2020 16:13	2.98	Forced Outage	To facilitate turbine balancing	Sep 1984
LUZON	HYD	Kalayaan 4	180	04/10/2020 20:11	04/10/2020 21:10	0.04	Forced Outage	Tripped as pump due to high temperature of turbine guide bearing.	May 2004

Annex A. Major Plant Outages

Region	Plant Type	Plant/ Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Outage Type	Remarks	Date Commissioned/ Commerical Operation
LUZON	COAL	Calaca 2	300	04/15/2020 15:43	04/18/2020 15:48	3.00	Maintenance Outage	Turbine maintenane scheduled repair.	Sep 1984
LUZON	COAL	Sual 2	647	04/16/2020 23:36	04/19/2020 19:22	2.82	Forced Outage	Condenser tube leak	Oct 1999
LUZON	NATG	San Gabriel	420	04/17/2020 13:42	04/18/2020 0:01	0.43	Forced Outage	Tripped due to gas turbine combustion instability	Mar 2016
LUZON	COAL	Pagbilao 1	382	04/17/2020 23:15	04/18/2020 20:08	0.87	Forced Outage	Unit Transformer protection actuated.(Initial Information)	Mar 1996
LUZON	COAL	Pagbilao 1	382	04/20/2020 0:55	04/26/2020 21:33	6.86	Forced Outage	To facilitate ESP repair	Mar 1996
VISAYAS	COAL	THVI 2	169	04/20/2020 2:54	04/20/2020 4:26	0.06	Forced Outage	Turbine protection trip	Dec 2017
LUZON	NATG	San Gabriel	420	04/20/2020 22:18	04/21/2020 10:14	0.50	Forced Outage	Tripped while on the process of shutdown.	Mar 2016
LUZON	COAL	Masinloc 1	315	04/21/2020 11:45	05/25/2020 0:13	33.52	Forced Outage	Boiler Tube Leak	Jun 1998
LUZON	NATG	San Gabriel	420	04/21/2020 21:40	04/22/2020 10:05	0.52	Forced Outage	Gas supply restriction	Mar 2016
LUZON	NATG	San Gabriel	420	04/22/2020 21:50	04/23/2020 10:10	0.51	Forced Outage	Gas supply restriction	Mar 2016
LUZON	COAL	Calaca 2	300	04/23/2020 17:32	04/23/2020 18:35	0.04	Forced Outage	Low pressure turbine exhaust problem	Sep 1984
LUZON	NATG	San Gabriel	420	04/23/2020 21:54	04/24/2020 10:07	0.51	Forced Outage	Gas supply restriction	Mar 2016
LUZON	NATG	San Gabriel	420	04/24/2020 21:45	04/26/2020 11:05	1.56	Forced Outage	Gas supply restriction	Mar 2016
LUZON	NATG	Sta. Rita 4	264	04/24/2020 22:37	04/27/2020 6:03	2.31	Forced Outage	Cleaning of Fuel gas control valve.	Oct 2001
LUZON	NATG	San Gabriel	420	04/26/2020 21:45	04/28/2020 10:06	1.51	Forced Outage	Gas supply restriction	Mar 2016
LUZON	COAL	Calaca 2	300	04/27/2020 19:07	04/27/2020 20:56	0.08	Forced Outage	Switchgear trouble	Sep 1984
LUZON	COAL	Masinloc 2	344	04/27/2020 22:54	04/29/2020 22:10	1.97	Forced Outage	Turbine Oil leak	Jun 1998
LUZON	COAL	Sual 2	647	04/30/2020 23:36	05/03/2020 18:20	2.78	Forced Outage	Emergency shutdown due to HP heater tube leak.	Oct 1999
LUZON	COAL	Pagbilao 1	382	05/01/2020 0:01	05/10/2020 15:02	9.63	Forced Outage	Electrostatic precipitator problem.	Mar 1996
LUZON	HYD	Kalayaan 3	180	05/03/2020 19:05	05/03/2020 20:17	0.05	Forced Outage	Tripped as pump due to loss of station service (tripping of Sta. Service Transformer 3)	May 2004
LUZON	COAL	GN Power 1	316	05/04/2020 3:18	05/05/2020 9:46	1.27	Forced Outage	Reheat Stop Valve problem	May 2013
LUZON	COAL	Pagbilao 1	382	05/12/2020 0:16	05/15/2020 4:03	3.16	Forced Outage	Emergency shutdown due to low temperature reheater problem	Mar 1996
LUZON	COAL	Calaca 2	300	05/12/2020 15:58	05/12/2020 18:44	0.12	Forced Outage	Tripped from 297MW load with Turbine Tripped indication. Lowest frequency is 59.256H	Sep 1984
LUZON	COAL	Calaca 2	300	05/14/2020 18:43	05/14/2020 21:06	0.10	Forced Outage	Tripped from 298MW. Lowest frequency is 59.3617Hz. Turbine tripped actuated	Sep 1984
LUZON	HYD	Kalayaan 1	180	05/14/2020 23:04	05/15/2020 1:17	0.09	Forced Outage	Failed to start as pump	Aug 1982
LUZON	COAL	Pagbilao 3	420	05/16/2020 4:21	05/20/2020 6:02	4.07	Forced Outage	Tripped at 131MW load. System Frequency at 59.53hz.	Jul 2017
LUZON	COAL	Pagbilao 1	382	05/16/2020 5:43	05/19/2020 2:18	2.86	Forced Outage	Tripped at 120MW load. System frequency at 59.32hz.	Mar 1996
LUZON	COAL	Pagbilao 2	382	05/16/2020 5:43	05/26/2020 22:44	10.71	Forced Outage	Tripped at 120MW load. System frequency at 59.32hz.	Mar 1996
LUZON	COAL	Calaca 2	300	05/17/2020 12:19	05/17/2020 13:53	0.07	Forced Outage	Reason still under investigation	Sep 1984
LUZON	COAL	Calaca 2	300	05/18/2020 2:20	05/29/2020 13:21	11.46	Forced Outage	Tripped at 150MW load. System Frequency at 59.46hz.	Sep 1984
LUZON	COAL	Pagbilao 1	382	05/19/2020 4:17	05/19/2020 6:02	0.07	Forced Outage	Boiler Drum Level Low	Mar 1996
LUZON	COAL	Pagbilao 1	382	05/20/2020 1:39	05/20/2020 16:45	0.63	Forced Outage	Loss of Generator Excitation	Mar 1996
LUZON	COAL	Pagbilao 1	382	05/20/2020 18:44	06/03/2020 3:01	13.35	Forced Outage	Due to loss of field excitation (AVR problem)	Mar 1996
LUZON	COAL	SBPL	455	05/23/2020 0:29	06/05/2020 7:10	13.28	Maintenance Outage	Maintenance Outage until 03 June 2020	Apr 2019
LUZON	NATG	San Gabriel	420	05/23/2020 21:40	05/24/2020 12:11	0.60	Forced Outage	Gas Restriction from Malampaya Onshore Gas Plant.	Mar 2016
LUZON	COAL	SMC 1	150	05/25/2020 2:19	06/05/2020 21:14	11.79	Forced Outage	Emergency shutdown to rectify hotspot at Lamao Substation and repair of coal feeders.	Nov 2016
LUZON	NATG	Sta. Rita 3	265.5	05/28/2020 8:52	05/29/2020 2:54	0.75	Forced Outage	Tripped due to trouble at power supply of steam turbine control cabinet	Oct 2001
LUZON	COAL	Calaca 2	300	05/30/2020 5:34	05/30/2020 7:46	0.09	Forced Outage	Tripped at 270MW load.	Sep 1984
LUZON	COAL	Calaca 2	300	05/30/2020 16:16	06/04/2020 3:28	4.47	Forced Outage	Unit Master Fuel Protection actuation. Tripped at 256MW load. System Frequency at 59.	Sep 1984
LUZON	NATG	Sta. Rita 1	257.3	05/31/2020 5:49	05/31/2020 20:38	0.62	Maintenance Outage	Rectification of main lube oil pump	Jun 2000
LUZON	NATG	San Gabriel	420	06/02/2020 21:44	06/03/2020 10:06	0.52	Forced Outage	Affected by the SPEX Malampaya Gas Supply restriction	Mar 2016
LUZON	COAL	GN Power 1	316	06/03/2020 15:38	06/04/2020 7:58	0.68	Forced Outage	Master fuel trip actuated	May 2013
LUZON	COAL	Pagbilao 1	382	06/03/2020 23:13	06/06/2020 8:52	2.40	Forced Outage	AVR problem	Mar 1996
LUZON	COAL	Pagbilao 2	382	06/04/2020 2:38	06/06/2020 22:51	2.84	Forced Outage	Boiler tube leak	Mar 1996
LUZON	COAL	Masinloc 2	344	06/04/2020 9:45	06/05/2020 4:05	0.76	Forced Outage	Aux. power supply problem (initial information)	Jun 1998
LUZON	NATG	Sta. Rita 1	257.3	06/04/2020 17:20	06/04/2020 18:45	0.06	Forced Outage	Tripped while on-going fuel changeover from Natural Gas to Oil	Jun 2000
LUZON	COAL	Masinloc 1	315	06/05/2020 0:49	06/06/2020 4:05	1.14	Forced Outage	Tripped due to unit auxiliary transformer trouble.	Jun 1998
LUZON	COAL	Masinloc 2	344	06/06/2020 20:32	06/07/2020 9:30	0.54	Forced Outage	Condenser vacuum trouble.	Jun 1998
LUZON	COAL	Pagbilao 2	382	06/06/2020 23:11	06/07/2020 0:43	0.06	Forced Outage	Tripped with 19MW load.	Mar 1996
VISAYAS	COAL	THVI 2	169	06/07/2020 15:40	06/09/2020 23:45	2.34	Forced Outage	Blower problem	Dec 2017
LUZON	NATG	San Lorenzo 1	264.8	06/07/2020 18:11	06/08/2020 2:14	0.34	Forced Outage	Tripped due to condenser vacuum trouble	Sep 2002
LUZON	NATG	San Lorenzo 1	264.8	06/08/2020 19:29	06/09/2020 22:25	1.12	Forced Outage	Condensing system trouble	Sep 2002
LUZON	NATG	San Lorenzo 1	264.8	06/09/2020 22:26	06/10/2020 0:09	0.07	Forced Outage	Cooling system problem	Sep 2002
VISAYAS	COAL	THVI 2	169	06/10/2020 11:04	06/20/2020 16:27	10.22	Forced Outage	TURBINE VIBRATION	Dec 2017
LUZON	NATG	San Lorenzo 1	264.8	06/10/2020 17:35	06/28/2020 0:42	17.30	Maintenance Outage	Maintenance outage(GOP)	Sep 2002
LUZON	NATG	San Lorenzo 2	261.8	06/11/2020 1:29	06/27/2020 22:34	16.88	Maintenance Outage	Maintenance outage (GOP).	Sep 2002
LUZON	COAL	SMC 2	150	06/11/2020 5:10	06/11/2020 12:33	0.31	Forced Outage	Secondary air fan high vibration.	Mar 2017
LUZON	COAL	SLPGC 2	150	06/11/2020 8:31	06/11/2020 18:11	0.40	Maintenance Outage	On-going maintenance test.	Jan 2015
LUZON	COAL	SMC 4	150	06/14/2020 7:17	06/14/2020 15:32	0.34	Forced Outage	To facilitate hotspot correction	Sep 2018
LUZON	COAL	Calaca 2	300	06/14/2020 20:54	06/15/2020 2:44	0.24	Forced Outage	Circulating Water Pump (CWP) trouble	Sep 1984
LUZON	COAL	Calaca 2	300	06/15/2020 8:33	06/15/2020 9:18	0.03	Forced Outage	Uncontrollable maim steam temperature	Sep 1984
LUZON	HYD	Kalayaan 3	180	06/16/2020 0:01	06/20/2020 23:35	4.98	Planned Outage	Maintenance Outage	May 2004
LUZON	HYD	Kalayaan 1	180	06/17/2020 8:49	08/09/2020 16:17	53.31	Forced Outage	Declared unavailable due to generator radiator water leak	Aug 1982
LUZON	COAL	Masinloc 1	315	06/19/2020 9:51	06/19/2020 16:23	0.27	Forced Outage	Tripped due to Auto Plant Control (APC Turbine-Generator Control)) trouble.	Jun 1998
LUZON	COAL	Sual 1	647	06/20/2020 22:33	06/22/2020 3:44	1.22	Forced Outage	Boiler circulating pump trouble.	Oct 1999
LUZON	COAL	Pagbilao 1	382	06/21/2020 0:31	07/18/2020 2:56	27.10	Planned Outage	Maintenance outage until 7.20.2020	Mar 1996
LUZON	HYD	Kalayaan 4	180	06/23/2020 0:01	07/02/2020 23:59	10.00	Planned Outage	Maintenance Outage until 02 July 2020	May 2004
LUZON	NATG	Sta. Rita 2	255.7	06/26/2020 2:27	06/29/2020 0:30	2.92	Planned Outage	Maintenance Outage until 28 June 2020.	Jun 2000
LUZON	COAL	Sual 2	647	06/26/2020 23:42	06/27/2020 10:05	0.43	Maintenance Outage	Maintenance outage.	Oct 1999
LUZON	HYD	Kalayaan 3	180	06/27/2020 9:01	06/27/2020 15:18	0.26	Forced Outage	Unable to sychronize due to tail water gate oil leak.	May 2004
LUZON	NATG	San Lorenzo 1	264.8	06/28/2020 9:58	06/28/2020 12:01	0.09	Forced Outage	Tripped by Boiler Protection from 170MW load	Sep 2002
LUZON	COAL	SLPGC 1	150	07/02/2020 14:05	07/02/2020 18:43	0.19	Forced Outage	Tripped by SIPS activation for N-1 contingency fo Group 1 Lines(Binan-Calaca Line)	Jan 2015
LUZON	HYD	Kalayaan 3	180	07/02/2020 17:26	07/02/2020 18:11	0.03	Forced Outage	Tripped at 135MW load. System Frequency at 59.52hz	May 2004
LUZON	NATG	Sta. Rita 1	257.3	07/04/2020 2:47	07/05/2020 23:28	1.86	Planned Outage	Planned Outage until 05 July 2020.	Jun 2000
LUZON	HYD	Kalayaan 3	180	07/06/2020 22:50	07/07/2020 3:24	0.19	Forced Outage	Tripped during start-up as pump	May 2004
LUZON	HYD	Kalayaan 4	180	07/06/2020 23:11	07/07/2020 2:09	0.12	Forced Outage	Failed to start as pump	May 2004
VISAYAS	COAL	PEDC 3	150	07/09/2020 22:11	07/10/2020 5:29	0.30	Forced Outage	Affected by line tripping.	Aug 2016
LUZON	COAL	GN Power 2	316	07/10/2020 22:41	07/11/2020 10:57	0.51	Forced Outage	Tripping of Induced Draft Fan A and B.	May 2013
LUZON	NATG	Sta. Rita 4	264	07/11/2020 2:42	07/16/2020 22:53	5.84	Planned Outage	Annual minor inspection and maintenance	Oct 2001
LUZON	COAL	Masinloc 2	344	07/11/2020 13:23	07/11/2020 20:28	0.30	Forced Outage	Tripped due to activation of high windage protection alarm.	Jun 1998
LUZON	COAL	Masinloc 2	344	07/11/2020 20:57	07/11/2020 23:18	0.10	Forced Outage	Tripped at 60MW load.System Frequency is 59.81hz.	Jun 1998
LUZON	COAL	Masinloc 1	315	07/12/2020 6:07	07/12/2020 23:43	0.73	Forced Outage	Reported fire occured at Mill D.	Jun 1998
VISAYAS	COAL	THVI 2	169	07/13/2020 10:37	07/24/2020 4:18	10.74	Forced Outage	Suspected Boiler Tube Leak	Dec 2017
LUZON	COAL	Masinloc 2	344	07/13/2020 20:37	07/14/2020 5:02	0.35	Forced Outage	Boiler flame loss	Jun 1998
LUZON	COAL	Masinloc 2	344	07/14/2020 5:34	07/15/2020 6:46	1.05	Forced Outage	Turbine tripped due to HP steam pressure low	Jun 1998
LUZON	NATG	Sta. Rita 3	265.5	07/17/2020 2:49	07/19/2020 23:27	2.86	Planned Outage	Maintenance outage.	Oct 2001
LUZON	NATG	San Gabriel	420	07/18/2020 0:45	07/23/2020 19:27	5.78	Planned Outage	Maintenance outage until 13 Sep 2020	Mar 2016
LUZON	COAL	GN Power 2	316	07/18/2020 19:32	07/30/2020 20:18	12.03	Forced Outage	Tripped due to boiler tube leak.	May 2013
LUZON	COAL	Masinloc 1	315	07/20/2020 12:59	10/11/2020 3:12	82.59	Planned Outage	Maintenance Outage until 13 September 2020	Jun 1998
LUZON	NATG	Sta. Rita 3	265.5	07/20/2020 14:43	07/20/2020 16:25	0.07	Forced Outage	Tripped due to actuation of generator protection	Oct 2001
LUZON	COAL	Masinloc 3	335	07/20/2020 17:47	07/22/2020 5:12	1.48	Forced Outage	Hot Reheat high temperature	Mar 2019
LUZON	HYD	Kalayaan 3	180	07/21/2020 10:01	07/21/2020 13:44	0.15	Forced Outage	Start-up failure due to kidney loop pump trouble	May 2004
LUZON	COAL	Calaca 2	300	07/22/2020 10:40	07/22/2020 13:14	0.11	Forced Outage	Turbine trip actuated. Tripped from 292MW load	Sep 1984
LUZON	COAL	Pagbilao 2	382	07/22/2020 17:22	08/21/2020 22:41	30.22	Planned Outage	Maintenance outage (GOP)	Mar 1996
LUZON	COAL	Masinloc 2	344	07/24/2020 1:34	07/26/2020 6:08	2.19	Forced Outage	Unplanned outage due to boiler tube leak.	Jun 1998
LUZON	COAL	Sual 1	647	07/24/2020 23:35	07/25/2020 14:21	0.62	Maintenance Outage	MO to rectify erratic movement of HP turbine Governing Valve (HPGV) 3	Oct 1999
LUZON	COAL	Masinloc 2	344	07/26/2020 9:37	07/26/2020 13:20	0.15	Forced Outage	Master fuel trip	Jun 1998
LUZON	COAL	SBPL	455	07/28/2020 5:48	07/28/2020 11:27	0.24	Forced Outage	Tripped at 295MW load. Probable reported cause of outage is lightning strike.	Apr 2019
VISAYAS	COAL	THVI 1	169	07/28/2020 11:18	08/02/2020 14:45	5.14	Forced Outage	AFFECTED BY TRIPPING OF CEDC - CALUNG2X L1	Dec 2017
VISAYAS	COAL	THVI 2	169	07/28/2020 11:18	08/01/2020 10:12	3.95	Forced Outage	AFFECTED BY TRIPPING OF CEDC - CALUNG2X L1	Dec 2017

Annex A. Major Plant Outages

Region	Plant Type	Plant/ Unit Name	Capacity (MW)	Date Out	Date In	Duration (Days)	Outage Type	Remarks	Date Commissioned/ Commerical Operation
LUZON	COAL	Calaca 1	300	07/30/2020 21:37	08/03/2020 12:15	3.61	Forced Outage	Reheater outlet leak.(RECLASSIFIED FROM FORCE. OMC OUTAGE)	Sep 1984
LUZON	COAL	GN Power 1	316	07/31/2020 13:26	08/09/2020 4:47	8.64	Forced Outage	Autotripped due to loss of power supply at 6kV bus.	May 2013
VISAYAS	COAL	THVI 1	169	08/02/2020 16:55	08/02/2020 17:50	0.04	Forced Outage	AUTO TRIP	Dec 2017
LUZON	COAL	Calaca 1	300	08/03/2020 15:06	08/03/2020 22:53	0.32	Forced Outage	Tripped while on load stabilization from start-up	Sep 1984
LUZON	COAL	SLPGC 2	150	08/05/2020 16:46	09/02/2020 4:48	27.50	Forced Outage	Boiler tube leak.	Jan 2015
LUZON	COAL	GN Power 2	316	08/07/2020 11:52	08/08/2020 14:04	1.09	Forced Outage	Tripped at 316MW load. System Frequency is 59.068hz. Turbine protection actuation.	May 2013
LUZON	COAL	GN Power 2	316	08/09/2020 6:52	08/09/2020 18:01	0.46	Forced Outage	Correction of critical hotspot at Main Unit Transformer.	May 2013
LUZON	COAL	GN Power 1	316	08/09/2020 9:54	08/09/2020 15:39	0.24	Forced Outage	Turbine driven trip.	May 2013
LUZON	COAL	Pagbilao 1	382	08/10/2020 1:26	08/15/2020 22:52	5.89	Forced Outage	Reason still to be determined	Mar 1996
LUZON	COAL	Masinloc 3	335	08/12/2020 15:05	08/14/2020 7:04	1.67	Forced Outage	Main fuel trip. On commissioning Test	Mar 2019
LUZON	HYD	Kalayaan 2	180	08/14/2020 8:51	08/14/2020 12:39	0.16	Forced Outage	Generator differential actuated.	Aug 1982
LUZON	COAL	SLPGC 1	150	08/15/2020 18:59	09/17/2020 21:07	33.09	Forced Outage	Boiler tube leak.	Jan 2015
LUZON	COAL	SMC 4	150	08/16/2020 2:21	08/17/2020 3:04	1.03	Forced Outage	Feedwater by-pass control valve trouble	Sep 2018
LUZON	COAL	SMC 3	150	08/19/2020 10:18	08/29/2020 2:04	9.66	Forced Outage	Boiler evaporator leak.	Nov 2017
LUZON	COAL	Calaca 2	300	08/23/2020 16:24	08/23/2020 18:23	0.08	Forced Outage	Boiler unit flame failure.	Sep 1984
LUZON	COAL	Sual 1	647	08/24/2020 20:28	08/30/2020 7:51	5.47	Forced Outage	Boiler tube leak.	Oct 1999
LUZON	COAL	SBPL	455	08/25/2020 17:17	09/11/2020 5:23	16.50	Forced Outage	Condenser tube leak.	Apr 2019
LUZON	COAL	SMC 2	150	08/26/2020 8:30	09/05/2020 19:23	10.45	Forced Outage	Tripped due to high furnace pressure.	Mar 2017
LUZON	NATG	San Gabriel	420	08/29/2020 22:04	09/01/2020 12:27	2.60	Forced Outage	Emergency shutdown. affected by SPEX natural gas restriction.	Mar 2016
LUZON	NATG	Sta. Rita 2	255.7	08/29/2020 23:10	08/30/2020 17:50	0.78	Forced Outage	Emergency shutdown. affected by SPEX natural gas restriction.	Jun 2000
LUZON	NATG	Sta. Rita 4	264	08/29/2020 23:58	08/30/2020 5:28	0.23	Forced Outage	Emergency shutdown. affected by SPEX natural gas restriction.	Oct 2001
LUZON	NATG	Sta. Rita 3	265.5	08/31/2020 21:04	09/01/2020 18:35	0.90	Forced Outage	Fault at GT Controller	Oct 2001
LUZON	HYD	Kalayaan 4	180	09/03/2020 11:14	09/03/2020 13:15	0.08	Forced Outage	Tripped with 160MW load.	May 2004
LUZON	COAL	Pagbilao 2	382	09/03/2020 22:29	09/07/2020 17:17	3.78	Forced Outage	Boiler Tube Leak.	Mar 1996
LUZON	NATG	Sta. Rita 2	255.7	09/05/2020 3:05	09/05/2020 4:01	0.04	Forced Outage	Tripped while on the process of fuel change-over from natural gas to oil.	Jun 2000
LUZON	NATG	Sta. Rita 2	255.7	09/05/2020 4:02	10/20/2020 9:59	45.25	Planned Outage	On planned outage.	Jun 2000
LUZON	COAL	Masinloc 2	344	09/05/2020 11:01	09/05/2020 16:04	0.21	Forced Outage	Tripped at 247MW load. System Frequency is 59.359hz.	Jun 1998
LUZON	NATG	San Gabriel	420	09/05/2020 17:14			Forced Outage	Tripped at 211MW load. System Frequency is 59.401hz.	Mar 2016
LUZON	COAL	Masinloc 2	344	09/05/2020 17:18	09/06/2020 0:47	0.31	Forced Outage	Tripped at 95MW load. System Frequency is 59.92hz.	Jun 1998
LUZON	COAL	GN Power 2	316	09/06/2020 16:29	09/09/2020 21:13	3.20	Forced Outage	Induced Draft Fan (IDF) trouble.	May 2013
LUZON	HYD	Kalayaan 4	180	09/07/2020 13:20	09/07/2020 19:13	0.25	Forced Outage	Circulating Water System(CWS) trouble.	May 2004
LUZON	COAL	Sual 2	647	09/16/2020 14:45			Forced Outage	Tripped due to high turbine vibration	Oct 1999
LUZON	COAL	Pagbilao 3	420	09/16/2020 20:56	09/17/2020 11:39	0.61	Forced Outage	Instrument air trouble	Jul 2017
VISAYAS	COAL	PEDC 3	150	09/24/2020 10:13	09/25/2020 22:51	1.53	Forced Outage	Affected by heavy fluctuation	Aug 2016
LUZON	COAL	GN Power 1	316	09/26/2020 2:55	09/27/2020 18:21	1.64	Forced Outage	Failed closure of interceptor valve.	May 2013
LUZON	COAL	Masinloc 2	344	09/27/2020 6:22	09/27/2020 12:56	0.27	Forced Outage	Generator protection actuated	Jun 1998
LUZON	COAL	SMC 4	150	10/03/2020 11:01	10/07/2020 14:38	4.15	Forced Outage	Emergency shutdown due to boiler tube leak.	Sep 2018
LUZON	HYD	Kalayaan 3	180	10/15/2020 19:10	10/15/2020 20:52	0.07	Forced Outage	Discordance at spherical valve.	May 2004
LUZON	COAL	Masinloc 1	315	10/15/2020 21:27	10/19/2020 3:20	3.25	Forced Outage	Unit Auxiliary Transformer oil leak at bushing.	Jun 1998
LUZON	COAL	Calaca 2	300	10/16/2020 16:36	11/04/2020 15:36	18.96	Forced Outage	Boiler Tube Leak.	Sep 1984
VISAYAS	COAL	THVI 1	169	10/16/2020 19:35	10/23/2020 8:36	6.54	Forced Outage	TRIPPED. UNDER ASSESSMENT	Dec 2017
LUZON	HYD	Kalayaan 3	180	10/17/2020 8:57	10/17/2020 9:18	0.01	Forced Outage	Actuation of differential protection for generator and transformer	May 2004
LUZON	NATG	Sta. Rita 2	255.7	10/20/2020 17:24	10/21/2020 10:54	0.73	Planned Outage	Commissioning test after major inspection	Jun 2000
VISAYAS	COAL	THVI 2	169	10/21/2020 3:56	10/28/2020 1:28	6.90	Forced Outage	Under assessment	Dec 2017
LUZON	COAL	SMC 1	150	10/21/2020 10:22	10/21/2020 15:14	0.20	Forced Outage	Main Steam Drum Level high	Nov 2016
LUZON	NATG	Sta. Rita 2	255.7	10/21/2020 19:42	10/23/2020 9:25	1.57	Planned Outage	Commissioning test after major overhaul	Jun 2000
LUZON	NATG	Sta. Rita 2	255.7	10/23/2020 19:18	10/24/2020 9:42	0.60	Planned Outage	Commissioning test after major overhaul	Jun 2000
LUZON	NATG	Sta. Rita 2	255.7	10/24/2020 11:16	10/29/2020 4:39	4.72	Forced Outage	Main Steam drain leak	Jun 2000
LUZON	NATG	Ilijan A1	190	10/26/2020 0:29	10/29/2020 13:58	3.56	Forced Outage	Contingency measure for the passage of Typhoon QUINTA	Jun 2002
LUZON	NATG	Ilijan A2	190	10/26/2020 6:33	10/29/2020 17:11	3.44	Forced Outage	Affected by the passage of Typhoon QUINTA (tripping of Dasma-Ilijan-Tayabas 500kV Lin	Jun 2002
LUZON	NATG	Ilijan A3	220	10/26/2020 6:33	10/29/2020 15:40	3.38	Forced Outage	Affected by the passage of Typhoon QUINTA (tripping of Dasma-Ilijan-Tayabas 500kV Lin	Jun 2002
LUZON	NATG	Ilijan B1	190	10/26/2020 6:33	10/30/2020 10:08	4.15	Forced Outage	Affected by the passage of Typhoon QUINTA (tripping of Dasma-Ilijan-Tayabas 500kV Lin	Jun 2002
LUZON	NATG	Ilijan B2	190	10/26/2020 6:33	10/30/2020 7:21	4.03	Forced Outage	Affected by the passage of Typhoon QUINTA (tripping of Dasma-Ilijan-Tayabas 500kV Lin	Jun 2002
LUZON	NATG	Ilijan B3	220	10/26/2020 6:33	10/30/2020 8:49	4.09	Forced Outage	Affected by the passage of Typhoon QUINTA (tripping of Dasma-Ilijan-Tayabas 500kV Lin	Jun 2002
LUZON	COAL	SLPGC 1	150	10/27/2020 12:26	10/27/2020 18:19	0.25	Forced Outage	Tripped due to high turbine vibration.	Jan 2015
LUZON	COAL	SLPGC 1	150	10/31/2020 21:25	11/16/2020 13:49	15.68	Forced Outage	Emergency shutdown due to boiler tube leak.	Jan 2015
LUZON	NATG	Ilijan A2	190	11/01/2020 1:37	11/03/2020 10:48	2.38	Forced Outage	Contingency measure by the plant for the passage of Typhoon ROLLY	Jun 2002
LUZON	NATG	Ilijan A3	220	11/01/2020 1:55	11/03/2020 9:34	2.32	Forced Outage	Contingency measure by the plant for the passage of Typhoon ROLLY	Jun 2002
LUZON	NATG	Ilijan A1	190	11/01/2020 2:06	11/03/2020 7:43	2.23	Forced Outage	Contingency measure by the plant for the passage of Typhoon ROLLY	Jun 2002
LUZON	NATG	Ilijan B1	190	11/01/2020 9:26	11/02/2020 16:17	1.29	Forced Outage	Affected by the passage of Super Typhoon ROLLY (contingency measure)	Jun 2002
LUZON	NATG	Ilijan B3	220	11/01/2020 10:24	11/02/2020 17:41	1.30	Forced Outage	Affected by the passage of Super Typhoon ROLLY (contingency measure)	Jun 2002
LUZON	NATG	Ilijan B2	190	11/01/2020 10:35	11/02/2020 18:57	1.35	Forced Outage	Affected by the passage of Super Typhoon ROLLY (contingency measure)	Jun 2002
LUZON	COAL	Pagbilao 1	382	11/01/2020 14:13	11/03/2020 14:06	2.00	Forced Outage	Affected by the passage of Super Typhoon ROLLY	Mar 1996
LUZON	NATG	Sta. Rita 2	255.7	11/01/2020 15:44	11/01/2020 22:29	0.28	Forced Outage	Plant contigency measure due to the passage of Super Typhoon ROLLY.	Jun 2000
LUZON	NATG	San Lorenzo 1	264.8	11/01/2020 16:35	11/02/2020 3:43	0.46	Forced Outage	Affected by the passage of Super Typhoon ROLLY (contingency measure)	Sep 2002
LUZON	NATG	San Lorenzo 1	264.8	11/02/2020 5:43	11/02/2020 12:36	0.29	Forced Outage	Emergency shutdown due to GT problem.	Sep 2002
LUZON	HYD	Kalayaan 1	180	11/04/2020 0:01	11/06/2020 17:07	2.71	Planned Outage	Maintenance Outage until 06 November 2020	Aug 1982
VISAYAS	COAL	THVI 2	169	11/05/2020 20:23	11/11/2020 2:30	5.25	Forced Outage	EMERGENCY SHUTDOWN DUE TO COAL FORWARDING BELT PROBLEM	Dec 2017
LUZON	COAL	SMC 1	150	11/05/2020 23:28	11/09/2020 10:05	3.44	Maintenance Outage	Maintenance outage.	Nov 2016
LUZON	HYD	Kalayaan 2	180	11/07/2020 23:48	11/08/2020 4:08	0.18	Forced Outage	Protection problem.	Aug 1982
LUZON	COAL	Pagbilao 2	382	11/08/2020 15:24	11/08/2020 17:49	0.10	Forced Outage	Tripped. With on-going troubleshing of PCB8-01CB24PAG during the incident.	Mar 1996
LUZON	HYD	Kalayaan 2	180	11/10/2020 0:01	11/20/2020 0:01	10.00	Planned Outage	Maintenance Outage until 19 November 2020.	Aug 1982
LUZON	HYD	Kalayaan 1	180	11/12/2020 0:23	11/12/2020 1:12	0.03	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Aug 1982
LUZON	HYD	Kalayaan 3	180	11/12/2020 0:23	11/12/2020 2:26	0.09	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	May 2004
LUZON	NATG	Ilijan B1	190	11/12/2020 0:43	11/12/2020 11:55	0.47	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	NATG	Ilijan B3	220	11/12/2020 0:48	11/12/2020 13:02	0.51	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	NATG	Ilijan A2	190	11/12/2020 0:51	11/13/2020 6:41	1.24	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	NATG	Ilijan B2	190	11/12/2020 0:51	11/12/2020 12:04	0.47	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	NATG	Sta. Rita 2	255.7	11/12/2020 1:08	11/13/2020 8:36	1.31	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses. (On Market Int	Jun 2000
LUZON	NATG	Sta. Rita 1	257.3	11/12/2020 1:21	11/13/2020 7:34	1.26	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2000
LUZON	NATG	San Lorenzo 2	261.8	11/12/2020 1:29	11/12/2020 6:42	0.22	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Sep 2002
LUZON	NATG	Ilijan A3	220	11/12/2020 1:50	11/13/2020 7:59	1.26	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	COAL	Calaca 2	300	11/12/2020 1:59	11/13/2020 0:14	0.93	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Sep 1984
LUZON	NATG	Ilijan A1	190	11/12/2020 2:06	11/13/2020 9:03	1.29	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 2002
LUZON	NATG	Sta. Rita 4	264	11/12/2020 2:09	11/13/2020 8:04	1.25	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Oct 2001
LUZON	COAL	Pagbilao 2	382	11/12/2020 2:12	11/12/2020 18:51	0.69	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Mar 1996
LUZON	COAL	SBPL	455	11/12/2020 2:24	11/12/2020 17:58	0.65	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Apr 2019
LUZON	COAL	Masinloc 1	315	11/12/2020 2:42	11/12/2020 22:01	0.80	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Jun 1998
LUZON	NATG	San Lorenzo 1	264.8	11/12/2020 4:12	11/12/2020 11:49	0.32	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Sep 2002
LUZON	COAL	SMC 3	150	11/12/2020 4:50	11/12/2020 20:59	0.67	Forced Outage	Advised to shutdown due to over generation caused by typhoon Ulysses.(On market inte	Nov 2017
LUZON	COAL	SMC 1	150	11/12/2020 21:34	11/13/2020 4:59	0.31	Forced Outage	Tripped at 75MW load. Turbine Protection actuation.	Nov 2016
LUZON	COAL	SMC 1	150	11/13/2020 15:21	11/14/2020 22:32	1.30	Forced Outage	Emergency shutdown to check the Boiler.	Nov 2016
LUZON	COAL	SLPGC 1	150	11/18/2020 21:28	11/18/2020 22:45	0.05	Forced Outage	Tripped at 150MW load. System Frequency is 59.609hz.	Jan 2015
LUZON	COAL	GN Power 1	316	11/20/2020 0:01	11/21/2020 12:44	1.53	Maintenance Outage	Maintenance Outage	May 2013
LUZON	HYD	Kalayaan 2	180	11/20/2020 0:02	11/22/2020 11:27	2.48	Forced Outage	Extension of outage maintenance activities	Aug 1982
LUZON	HYD	Kalayaan 2	180	11/22/2020 20:35	11/23/2020 1:02	0.19	Forced Outage	Excessive water leak at cooling system	Aug 1982
LUZON	HYD	Kalayaan 2	180	11/23/2020 2:54	11/23/2020 4:37	0.07	Forced Outage	Oil circularing pump trouble	Aug 1982
LUZON	HYD	Kalayaan 3	180	11/24/2020 0:01	12/06/2020 0:01	12.00	Planned Outage	Maintenance Outage	May 2004
LUZON	COAL	Masinloc 3	335	11/24/2020 20:20			Forced Outage	Excitation Trouble	Mar 2019
LUZON	COAL	Calaca 1	300	11/25/2020 0:44			Planned Outage	Maintenance Outage until 09 Jan 2021	Sep 1984
LUZON	COAL	Pagbilao 3	420	11/25/2020 15:39	11/26/2020 12:20	0.86	Forced Outage	Inspection and repair of governor valve	Jul 2017