Market Surveillance Committee Annual Market Assessment Report

26 November 2020 to 25 November 2021

OCTOBER 2022

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 the results on the integrated Luzon and Visayas operations of the Wholesale Electricity Spot Market (WESM) for the covered period of the 1-hour market regime (26 November 2020 to 25 June 2021), and the Enhanced WESM Design and Operations or the 5-minute market regime (26 June to 25 November 2021) of the year 2021. This includes an overview on the results of the market performance, trends, and the corresponding drivers which in turn provide the means to assess competition and conditions in the WESM, as well as the bidding behavior of trading participants. The report is sectionalized into seasons[1] such as the Cool Dry Season (26 November 2020 to 25 February 2021), Hot Dry Season (26 February to 25 May 2021), and Rainy Season (26 May to 25 November 2021).

I. Highlights of the Market

A. Old Market Regime (1-hour Market)

- Relatively low level of demand was observed due to the community quarantine that was enforced brought about by the COVID-19 pandemic.
- High level of outage capacity was noted due to forced and planned outages where the latter was mainly attributable to the scheduled maintenance as approved in the Grid Operating Maintenance Program (GOMP) of the NGCP and the technical issues of the generating units aggravated by the restriction of natural gas from the SPEX Malampaya.
- Driven by depressed demand, high level of average supply margin was noted even with the observance of high outage capacity. As a result, consistent low market prices were observed.
- No administered price and secondary price cap were imposed during the Cool Dry season (26 Nov 2020 to 25 Feb 2021). Cumulative price threshold was breached for a total of 55 intervals starting from 04 May 2021 01:00 AM to 22 May 2021 03:00 AM resulting in the imposition of the secondary price cap. The last time this occurred was in June 2019.
- Deration in the available capacity of natural gas plants occurred due to SPEX Malampaya gas supply restriction effective 22 March 2021, 10:00 PM.
- High level of outage capacity persisted during the hot dry season due to forced outages of various power plants.
- Damaged Samboan-Amlan 138KV submarine cable that cut in half the line transfer capacity between Cebu and Negros (180 MW to 90 MW) resulted to frequent congestions. Based on the ERC order, PEMC is to halt collection of congestion fees associated with Cebu-Negros cable outage.

[1] Cool Dry Season (26 Nov 2020 to 25 Feb 2021), Hot Dry Season (26 Feb 2021 to 25 May 2021), Rainy Season (26 May 2021 to 25 Nov 2021)

Table 1. Significant events in WESM

Billing Month	Significant events in WESM
May 2021	Average monthly price increased to double at an average of PHP8,035/MWh from PHP4,071/MWh on April

B. Enhanced WESM Design and Operations (5-minute Market)

- The commercial operation of 5-minute market (Enhanced WESM Design and Operations or EWDO) commenced on 26 June 2021.
- This was in compliance with the DOE directives contained in the DOE issued circulars[2] in 2015 and 2016 providing policies on the enhancements to WESM design and operations. This was also in relation to the findings and recommendations of previous market audits with the aim of improving the operational efficiency of the WESM.
- Prices in the market were generally trending up due to the drop in effective supply and subsequently led to supply margins thinning out. As a result, level of imposition of the secondary price cap rose.
- Extreme nodal price separation took place among the islads of Negros, Panay and Bohol due to the damaged submarine cable.
- The new market regime (5-minute market) was observed to have had more secondary price cap impositions compared to the previous regime (1-hour market). This was especially persistent in June and July 2021.
- Power plants that relied on fuel from the Malampaya's natural gas production had to shut down following the SPEX Malampaya Maintenance Program in October 2021.
- Breakdown of the season's market intervention and market suspension events is as follows:

Table 2. Number of Market Intervention and Market Suspension Intervals, 2021

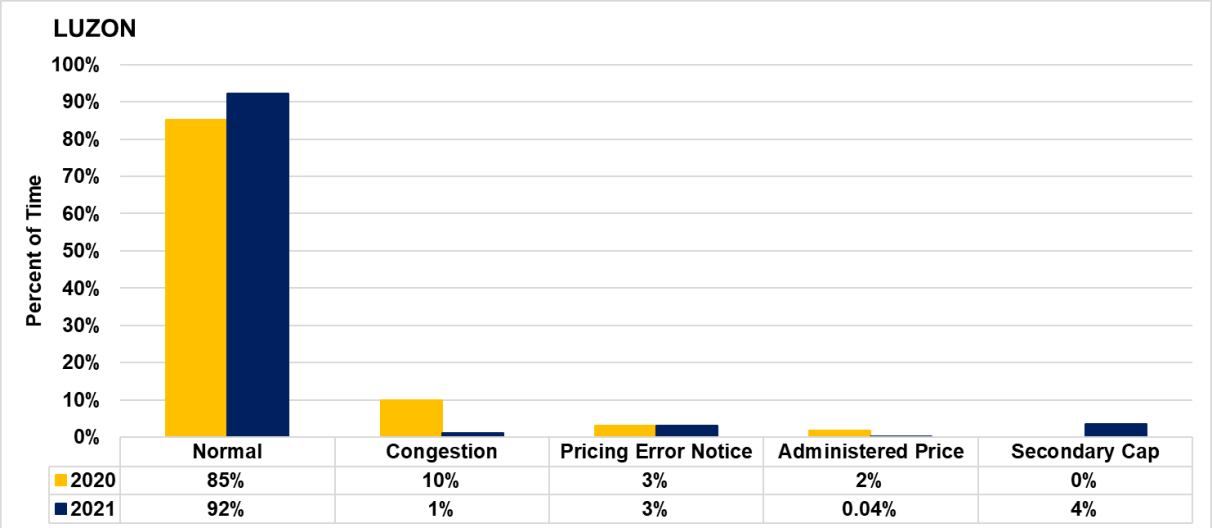
Number of Market Intervention Intervals	Reason for Market Intervention
11 SO-initiated in Luzon	Insufficient supply leading to manual load dropping
285 SO-initiated in Visayas	
10 MO-initiated System-wide	MMS stoppage

II. Assessment of the Market

- Majority of the time or 91~92 percent (45,311 trading intervals for Luzon and 44,890 for Visayas), the market cleared under a normal pricing condition.
- This was an increase from last year's 85~86 percent which was mainly attributed to lesser intervals with congestion.
- Congestion situation only occurred at 1 percent of the time, from a high of 10~11 percent last year, as Price Substitution Methodology (PSM) was applied to 518 trading intervals. Over half of these intervals were due to the frequent congestion of the Samboan-Amlan line connection between the Cebu-Negros islands.

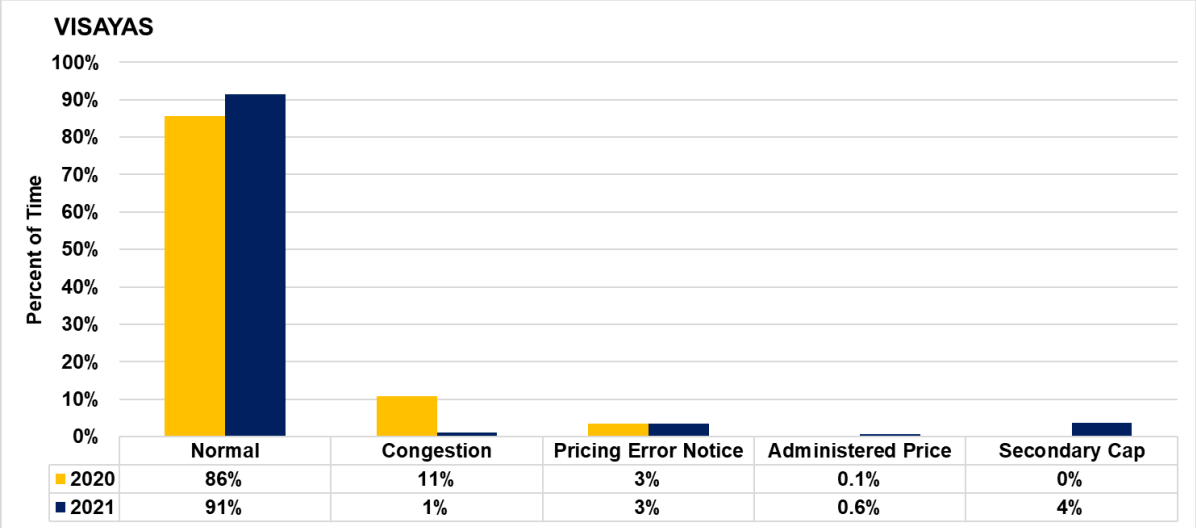
[2] Circular 2015-010-0015
Circular 2016-010-0014

- Intervals with pricing error remained around 3 percent of the time both for Luzon (1,537 trading intervals) and Visayas (1,677 trading intervals) mainly accounted to inappropriate input data.
- The frequency of administered prices (AP) resulting from market intervention and market suspension events significantly decreased in Luzon from 2 percent (153 trading intervals) in 2020 to 0.04 percent (21 trading intervals) in 2021. The inverse is observed in Visayas where the percentage points went up from 0.1 to 0.6.
- Marked uptick in the trend of intervals imposed with the secondary price cap was noted. This was more evident after the commencement of the EWDO. Statistics showed that 4 percent of the time the cumulative price threshold of PHP9,000/MWh was breached.
- Regional differences of prices between the Luzon and Visayas grids were likewise present as a result of the binding status of the high-voltage direct current (HVDC) line in a number of instances for the covered period.



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
2020	85%	10%	3%	2%	0%
2021	92%	1%	3%	0.04%	4%

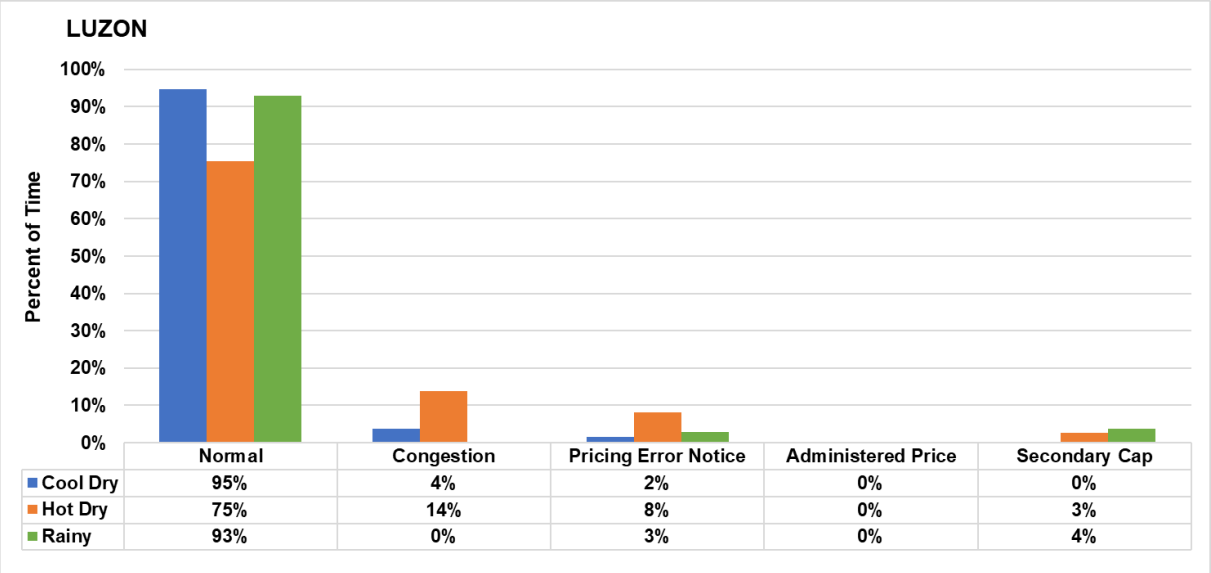
Figure 1. Summary of Pricing Conditions in Luzon, 2020 to 2021



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
2020	86%	11%	3%	0.1%	0%
2021	91%	1%	3%	0.6%	4%

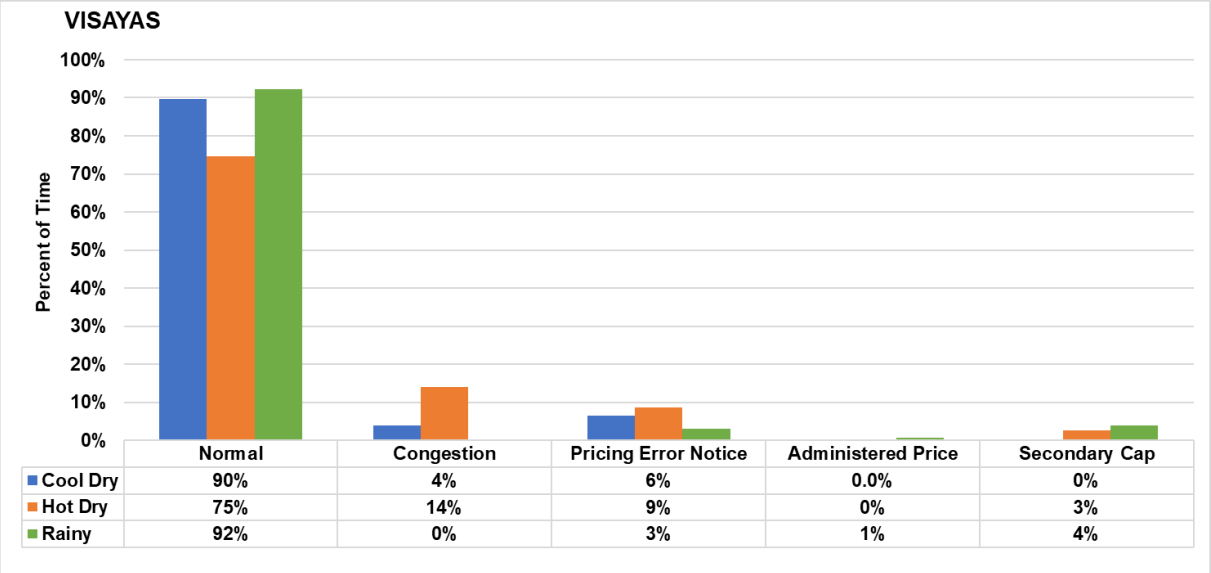
Figure 2. Summary of Pricing Conditions in Visayas, 2020 to 2021

- In Luzon, the cool dry season recorded the most share of normal market pricing outcomes while at the same time noting the lowest in terms of imposition of PEN and secondary price cap. Meanwhile, for the Visayas region, intervals with PEN maintained a 3~4 percent share all throughout the year.
- Intervals under market intervention and market suspension were either due to MMS stoppage, non-generation of RTD schedule or insufficient supply leading to manual load dropping.



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
Cool Dry	95%	4%	2%	0%	0%
Hot Dry	75%	14%	8%	0%	3%
Rainy	93%	0%	3%	0%	4%

Figure 3. Summary of Pricing Conditions in Luzon, 2021 Seasons



	Normal	Congestion	Pricing Error Notice	Administered Price	Secondary Cap
Cool Dry	90%	4%	6%	0.0%	0%
Hot Dry	75%	14%	9%	0%	3%
Rainy	92%	0%	3%	1%	4%

Figure 4. Summary of Pricing Conditions in Visayas, 2021 Seasons

III. Market Outcome[3]

A. Price

i. Price and Supply Margin

- The year-on-year load-weighted average price (LWAP) nearly doubled from PHP2,790/MWh in 2020 to PHP5,266/MWh in 2021. The stark disparity was driven by the abnormally low market price during the height of the pandemic when the demand was plummeting.
- The uptrend in LWAP was also shaped by the downturn of yearly average supply margin by 76 percent.
- The rise in ramp limited capacities in the new market regime contributed to this reduced supply in the grid. Ramping limitation happens when generator power output is restricted from delivering its maximum offered capacity due to the ramp rates offered in the market as well as the shorter timeframe to respond to what could have been a higher dispatch schedule. This is particularly true when large generating plants with slower ramp rates and relatively cheaper offer prices are unable to quickly generate power to meet the sudden change in demand.
- As a result, ramp-limited generator units, become price takers and their offer prices will not clear or influence the market. The opposite also holds true for ramping down limitations of generators but will clear a cheaper price instead.

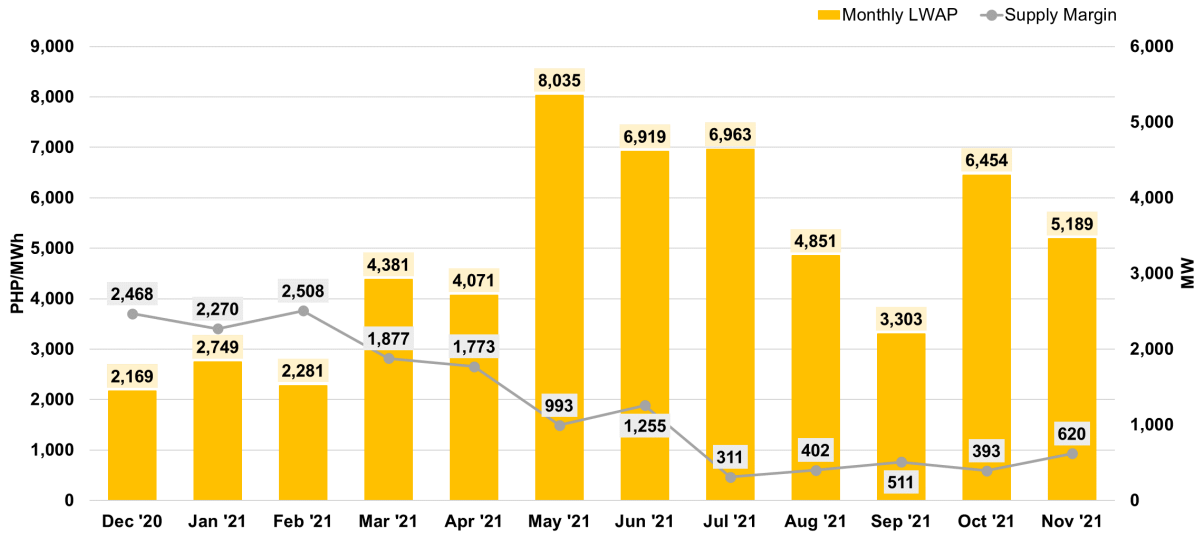


Figure 5. Daily System LWAP and Hourly Supply Margin, 2020 to 2021

[3] 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.

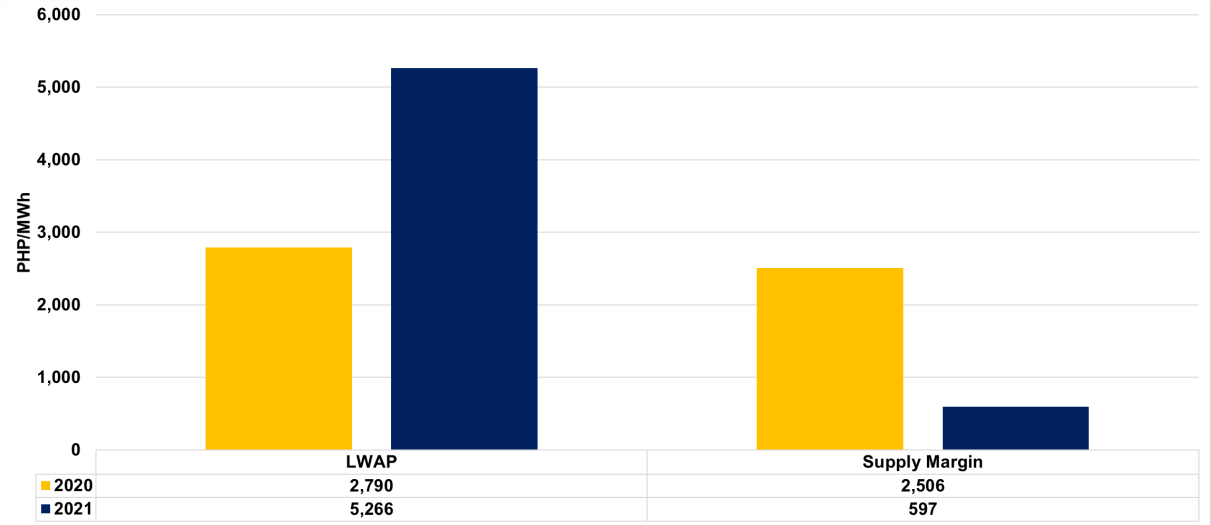


Figure 6. System LWAP and Average Supply Margin, 2020 to 2021

- While the 2020 cool dry season proved to be the higher LWAP than 2021, its counterpart seasons posted the lower level of average LWAP experiencing notable jumps come 2021:
  - Cool Dry – 41 percent decrease from PHP4,051/MWh to PHP2,395/MWh
  - Hot Dry – 178 percent increase from PHP2,010/MWh to PHP5,585/MWh
  - Rainy – 112 percent increase from PhP2,535/MWh to PHP5,376/MWh
- The exact opposite can be said to the trend of the average supply margin:
  - Cool Dry – 2 percent increase from 2,368 MW to 2,415 MW
  - Hot Dry – 48 percent decrease from 2,993 MW to 1,543 MW
  - Rainy – 80 percent decrease from 2,331 MW to 462 MW

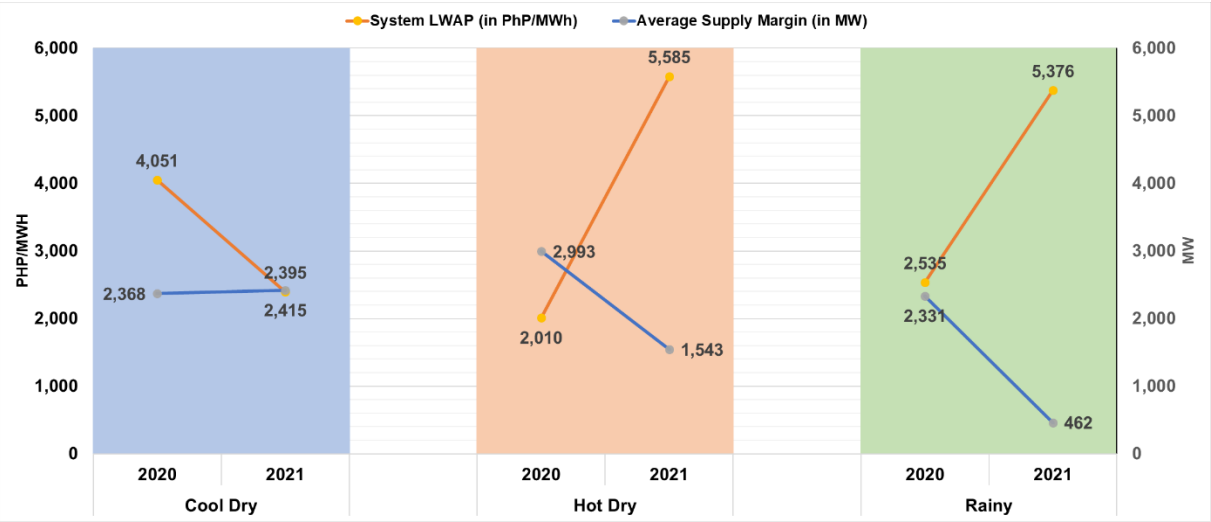


Figure 7. System LWAP and Average Supply Margin, 2020 to 2021 Seasons

- Average price of peak hours during the hot dry season saw the greatest increase at around 252 percent attributed to the upward movement of demand together with the eventual economic recovery of industries.
- Off-peak prices in the hot dry and rainy season of 2021 likewise posted respective spikes of 104 and 121 percent hovering at around the PHP4,000/MWh mark; meanwhile, a growth in the peak prices for the rainy season coincided with the gradual relaxation of community quarantine protocols, and the unavailability of some generators due to ramp limited capacities.

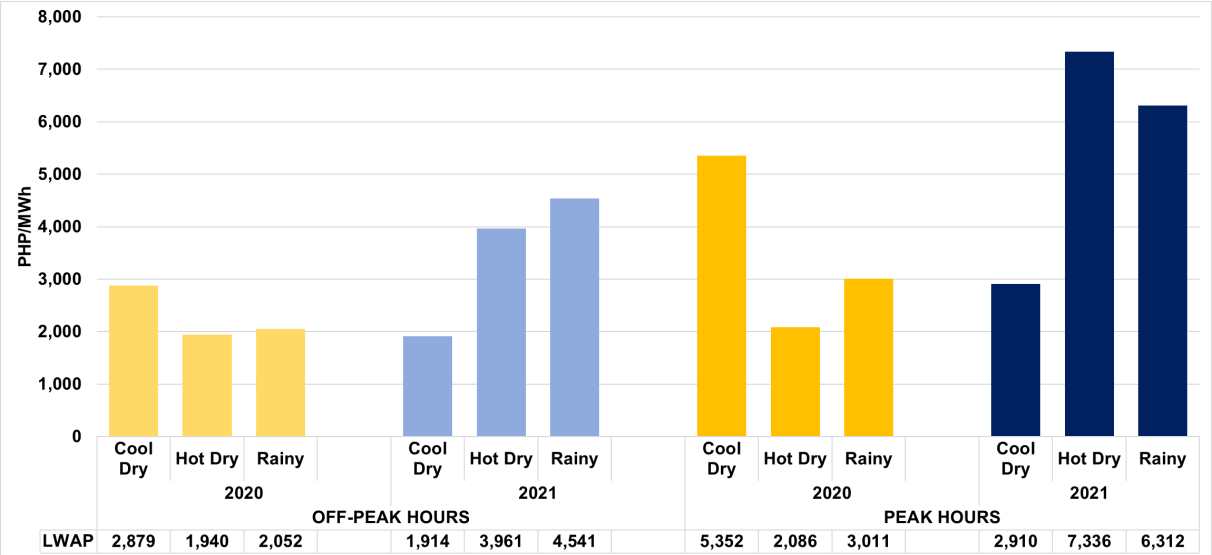
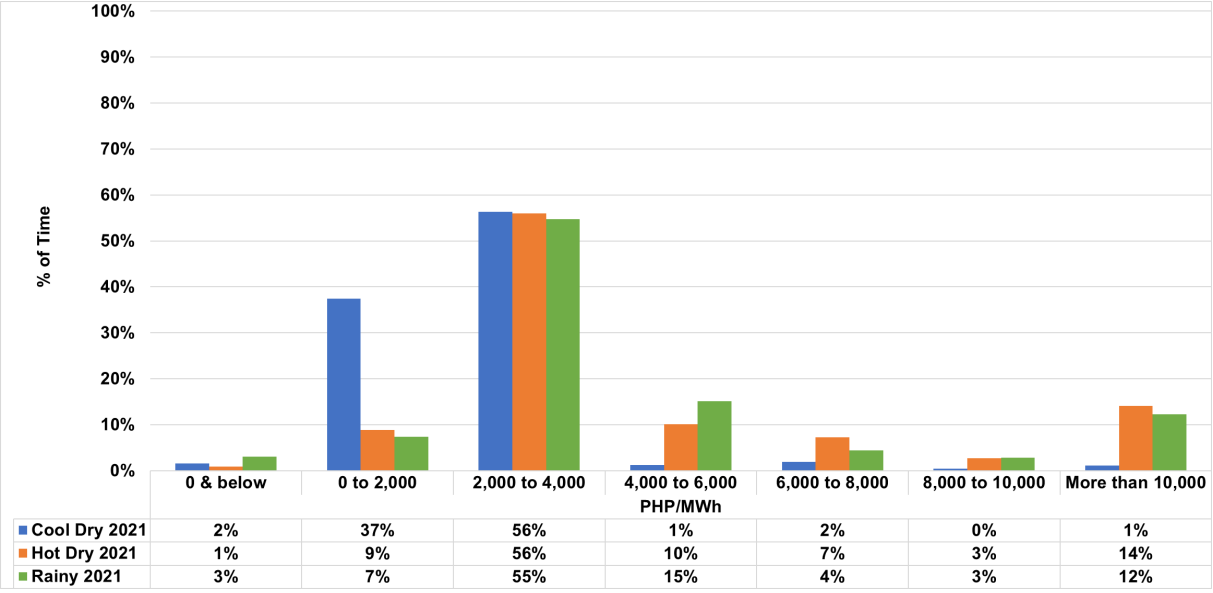


Figure 8. System LWAP Based on Hour Type, 2020 to 2021 Seasons

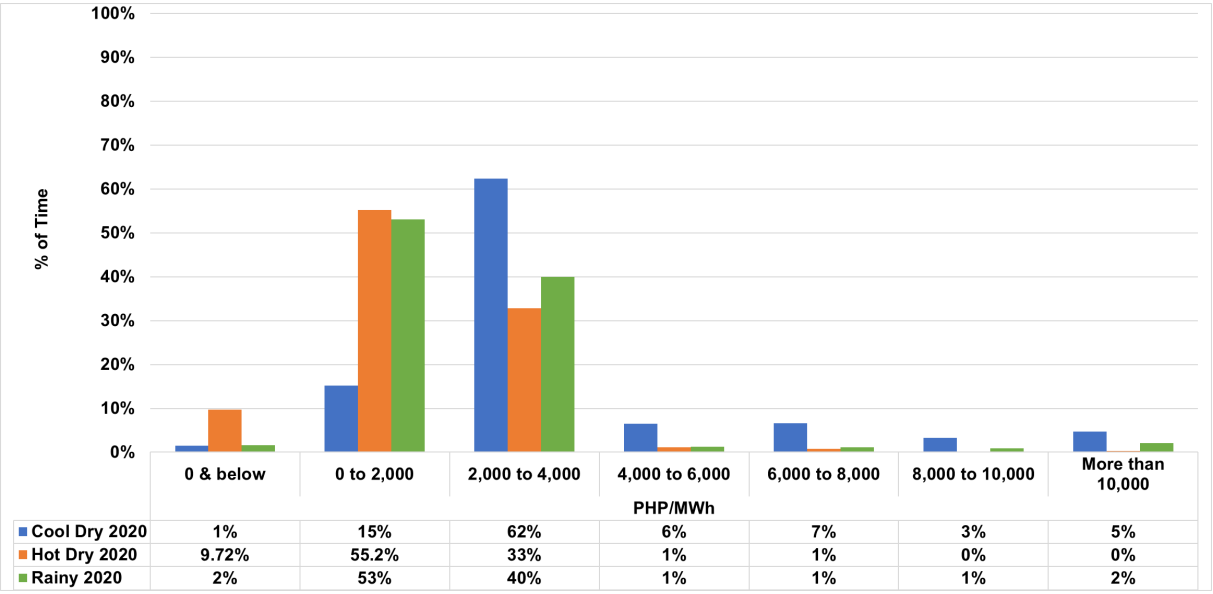
ii. Price Distribution

- Majority of the hourly prices in 2021 lie within the PHP2,000/MWh to PHP4,000/MWh range as compared to last year when most were within the PhP0/MWh to PhP2,000/MWh range.
- Surprisingly, the rainy season recorded the highest percentage of prices above PHP4,000/MWh, among other periods of the year.



	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 2021	2%	37%	56%	1%	2%	0%	1%
Hot Dry 2021	1%	9%	56%	10%	7%	3%	14%
Rainy 2021	3%	7%	55%	15%	4%	3%	12%

Figure 9. System LWAP Frequency Distribution, 2021 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 2020	1%	15%	62%	6%	7%	3%	5%
Hot Dry 2020	9.72%	55.2%	33%	1%	1%	0%	0%
Rainy 2020	2%	53%	40%	1%	1%	1%	2%

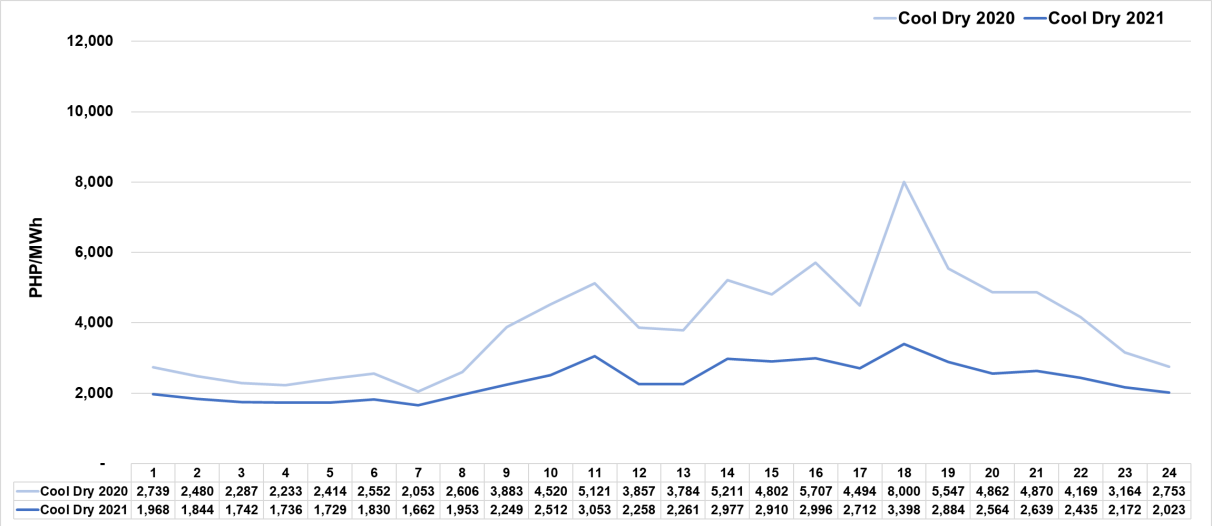
Figure 10. System LWAP Frequency Distribution, 2020 Seasons

iii. Hourly Price Profile

- On an hourly resolution, the 2021 price pattern for all seasons can somehow be depicted as an inflated shape from last year with exponential increases mostly across the peak hours.
- Among all seasons, the hot dry period experienced the most drastic change in price movement coming from an almost flat trend to a more spikey and volatile pattern owing to high system demand and depleted supply margin during this time.
- Even with the onset of the rainy season, average system demand maintained its level, posting almost the same with that of the hot dry season while average

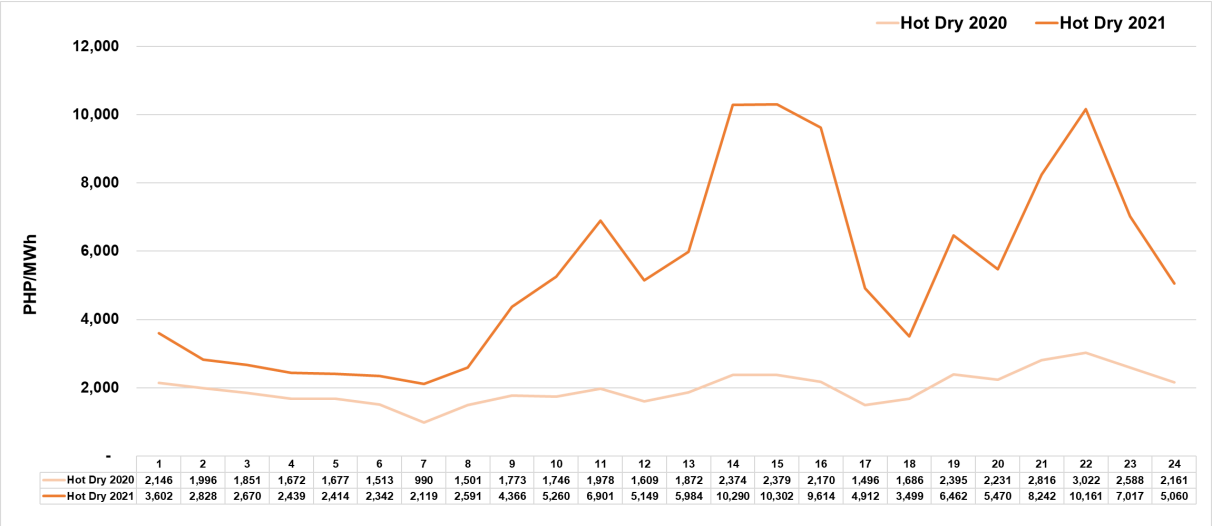
effective supply dipped, resulting in doubling of prices in comparison to its seasonal counterpart in 2020.

- Throughout the different seasons in 2021, market prices peaked at different trading intervals, indicating different patterns of interplay between the supply and demand. High prices were noted during the following season and intervals:
    - Cool Dry – evening at 1800H in 2020 and 2021
    - Hot Dry – evening at 2200H in 2020, and afternoon at 1500H in 2021
    - Rainy – afternoon at 1400H in 2020, and evening at 2200H in 2021



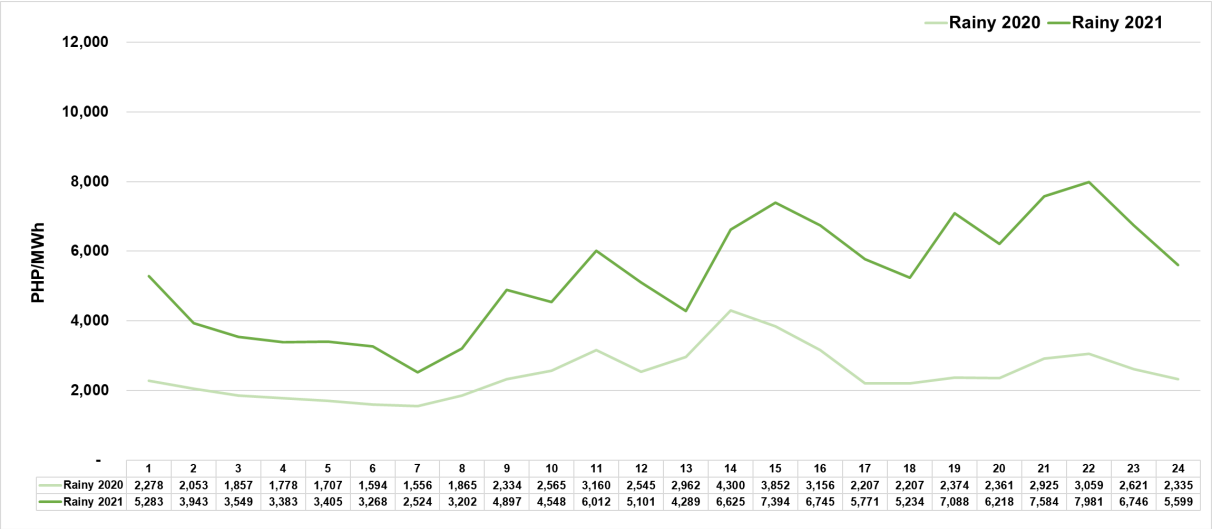
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Cool Dry 2020	2,739	2,480	2,287	2,233	2,414	2,552	2,053	2,606	3,883	4,520	5,121	3,857	3,784	5,211	4,802	5,707	4,494	8,000	5,547	4,862	4,870	4,169	3,164	2,753
Cool Dry 2021	1,968	1,844	1,742	1,736	1,729	1,830	1,662	1,953	2,249	2,512	3,053	2,258	2,261	2,977	2,910	2,996	2,712	3,398	2,884	2,564	2,639	2,435	2,172	2,023

Figure 11. System LWAP Hourly Curve, 2020 to 2021 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 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
Hot Dry 2021	3,602	2,828	2,670	2,439	2,414	2,342	2,119	2,591	4,366	5,260	6,901	5,149	5,984	10,290	10,302	9,614	4,912	3,499	6,462	5,470	8,242	10,161	7,017	5,060

Figure 12. System LWAP Hourly Curve, 2020 to 2021 Hot Dry



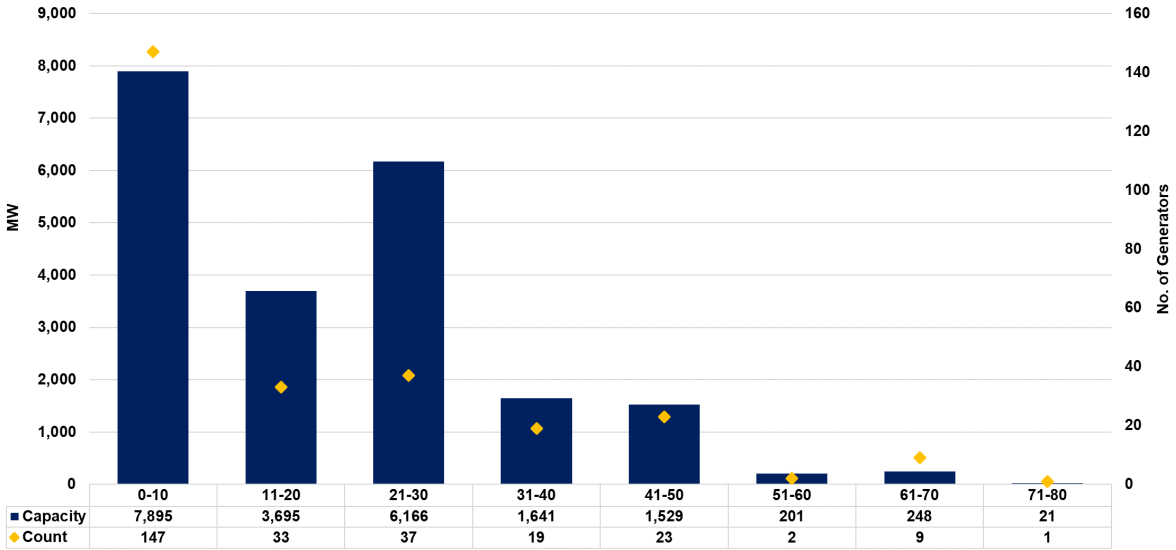
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Rainy 2020	2,278	2,053	1,857	1,778	1,707	1,594	1,556	1,865	2,334	2,565	3,160	2,545	2,962	4,300	3,852	3,156	2,207	2,207	2,374	2,361	2,925	3,059	2,621	2,335
Rainy 2021	5,283	3,943	3,549	3,383	3,405	3,268	2,524	3,202	4,897	4,548	6,012	5,101	4,289	6,625	7,394	6,745	5,771	5,234	7,088	6,218	7,584	7,981	6,746	5,599

Figure 13. System LWAP Hourly Curve, 2020 to 2021 Rainy

B. Supply

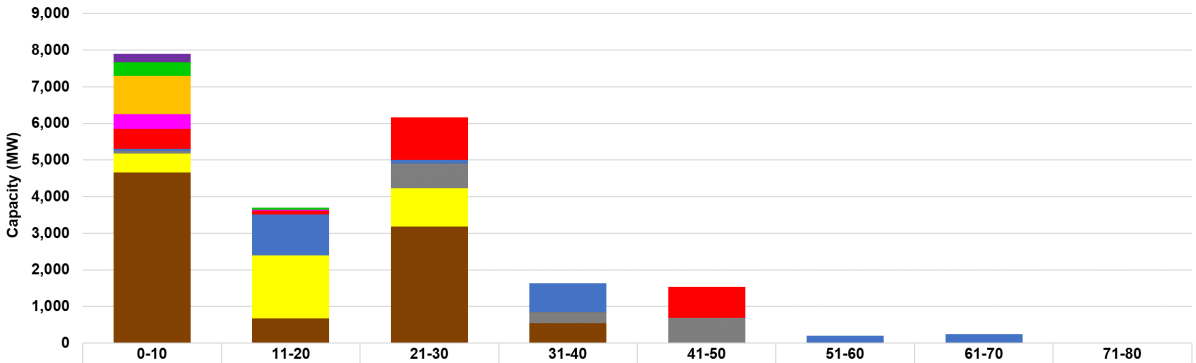
i. Capacity Profile

- Based on age of power plants, 180 out of 271 generator resources, within the age range of 0-20 years have an aggregate capacity of 11,590 MW and have continued to comprise 66 percent of the total WESM registered capacity as of 2021.
- Despite the entry of new plants this year, thereby increasing the total registered capacity by 581 MW, generators beyond 20 years of age remain to hold 46 percent of the total registered capacity.



	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Capacity	7,895	3,695	6,166	1,641	1,529	201	248	21
Count	147	33	37	19	23	2	9	1

Figure 14. Capacity Profile by Age of Plants, 2021



	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
BAT	230	-	-	-	-	-	-	-
BIOF	371	50	-	-	-	-	-	-
SOLR	1,048	-	-	-	-	-	-	-
WIND	395	33	-	-	-	-	-	-
OIL	545	100	1,166	-	834	-	-	-
HYD	56	1,114	98	788	12	201	248	21
GEO	80	-	678	313	683	-	-	-
NATG	513	1,727	1,043	-	-	-	-	-
COAL	4,657	671	3,182	540	-	-	-	-

Figure 15. Capacity Profile by Age of Plants by Resource Type, 2021

- A net increase[4] of 608 MW was accounted in the total registered capacity[5] from 2020 to 2021
- Of the newly registered power plants in the WESM, about 36 percent or 210 MW was attributed to the entry of battery plants.
- Update and changes to the capacity of various existing plants accounted for 121 MW increase and 89.1 MW derating.
- The 1590 Energy Corporations' Bauang Diesel Power Plant capacity was disaggregated into three (3) units.
- A total capacity of 5 MW ceased registration in the WESM which was attributed to one (1) Natural Gas power plant.

[4] Net increase is the remaining capacities after the noted changes in the registered capacity.
[5] 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. Plants with Increase/Decrease Capacity, 2020 to 2021

Plant Type	Market Participant Name	Node ID	Capacity		
			2020	2021	Change
New Registered Plants					
BAT	Universal Power Solutions, Inc.	01LAMAO_BAT		20	20
	Universal Power Solutions, Inc.	01LIMAY_BAT		40	40
	Masinloc Power Partners Co. Ltd.	01MSINLO_BAT		10	10
	Universal Power Solutions, Inc.	01SNMAN_BAT		60	60
	GIGA ACE 4, Inc.	03ALMNOS_BAT		40	40
	Universal Power Solutions, Inc.	05TOLEDO_BAT		20	20
	Universal Power Solutions, Inc.	07UBAY_BAT		20	20
BIOF	HyperGreen Energy Corporation	01HYPGRN_G01		12	12
HYDRO	Labayat 1 Hydropower Corporation	03UPLAB_G01		3.3	3.3
OIL	Ingrid Power Holdings, Inc.	03INGRID_GS1		28.3	28.3
	Ingrid Power Holdings, Inc.	03INGRID_GS2		22.9	22.9
	Ingrid Power Holdings, Inc.	03INGRID_GS3		22.5	22.5
	Ingrid Power Holdings, Inc.	03INGRID_GS4		28.4	28.4
	Ingrid Power Holdings, Inc.	03INGRID_GS5		22	22
	Ingrid Power Holdings, Inc.	03INGRID_GS6		28.4	28.4
SOLR	Bataan Solar Energy Inc.	01BTSOLEN_G01		3.7	3.7
	GIGASOL3, Inc.	01GIGSOL_G01		55	55
	Terasu Energy Inc.	01TERASU_G01		40.1	40.1
	Ecopark Energy of Valenzuela Corp.	02ECOTAGA_G01		14.7	14.7
	SOLARACE1 Energy Corp.	03SOLACE_G01		89.4	89.4
				SUB-TOTAL:	**580.7**
Plants that Increased Capacity					
COAL	Petron Corporation	01PETRON_G01	70	140	70
HYDRO	Sunwest Water and Electric Company 2, Inc.	08SUWECO_G01	8	8.1	0.1
OIL	Central Negros Power Reliability, Inc.	06CENPRI_U01	4.3	4.5	0.2
	Central Negros Power Reliability, Inc.	06CENPRI_U02	4.3	4.5	0.2
	Central Negros Power Reliability, Inc.	06CENPRI_U03	4.3	4.5	0.2
	Central Negros Power Reliability, Inc.	06CENPRI_U04	6.4	6.7	0.3
	Central Negros Power Reliability, Inc.	06CENPRI_U05	6.6	6.7	0.1
SOLR	Solar Philippines Tarlac Corporation	01CONSOL_G01	75	76	1
	SPARC-Solar Powered Agri-Rural Communitie	01SPABUL_G01	1.2	3.7	2.5
	Jobin-SQM Inc.	01SUBSOL_G01	29.3	59.3	30
	Valenzuela Solar Energy, Inc.	02VALSOL_G01	6.7	7.4	0.7
	Cosmo Solar Energy, Inc.	08COSMO_G01	5.67	5.7	0.03
WIND	PetroWind Energy Inc.	08PWIND_G01	21	36.7	15.7
				SUB-TOTAL:	**121.0**
Plants that Decreased Capacity					
BIOF	Universal Robina Corporation	06URC_G01	40	20	-20
	Victorias Milling Company,Inc.	06VMC_G01	34	2.5	-31.5
COAL	SEM-Calaca Power Corporation	03CALACA_G01	300	240	-60
	Toledo Power Company	05TPC_G02	145	142.7	-2.3
HYDRO	Vivant Sta. Clara Northern Renewables Generatior	01BAKUN_G01	76	74	-2
	Philippine Power and Development Company	03BALUG_G01	1.2	1.1	-0.1
	Philippine Power and Development Company	03PALAK_G01	1.6	1.5	-0.1
NATG	Prime Meridian PowerGen Corporation	03AVION_U01	50.3	47.2	-3.1
	Prime Meridian PowerGen Corporation	03AVION_U02	50.3	45.8	-4.5
OIL	Therma Power-Visayas, Inc.	05TPVI_U01	6.8	6.7	-0.1
	SPC Island Power Corporation	08PDPP3_G01	62	50	-12
SOLR	SPARC-Solar Powered Agri-Rural Communities Cor	01BTNSOL_G01	5	4.8	-0.2
	PetroSolar Corporation	01PETSOL_G01	45.5	44.4	-1.1
	SPARC-Solar Powered Agri-Rural Communities Cor	01ZAMSOL_G01	5	4.8	-0.2
	Sulu Electric Power and Light (Phils.), Inc.	04SEPSOL_G01	45	41.6	-3.4
				SUB-TOTAL:	**-89.1**
Ceased Registration					
NATG	Pilipinas Shell Petroleum Corporation	3PSHELL_G01	5.0		-5
				SUB-TOTAL:	**-5.0**
				GRAND TOTAL:	**608**

- Available capacity[6] with respect to the total registered capacity experienced a slight decline coming from a 71.8 percent share to 70 percent.
- Average effective supply[7] from last year's 13,140 MW to this year's 11,904 MW translated into 56 percent share in the total registered capacity.

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

[7] 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

- One of the reasons for the decline in available supply was the increase in capacities not offered by power plants from 15.0 percent in 2020 to 16.6 percent in 2021.
- Further, outage capacities increased to an average of 2,863 MW from 2,654 MW in 2020, comprising 13.4 percent of the total registered capacity.

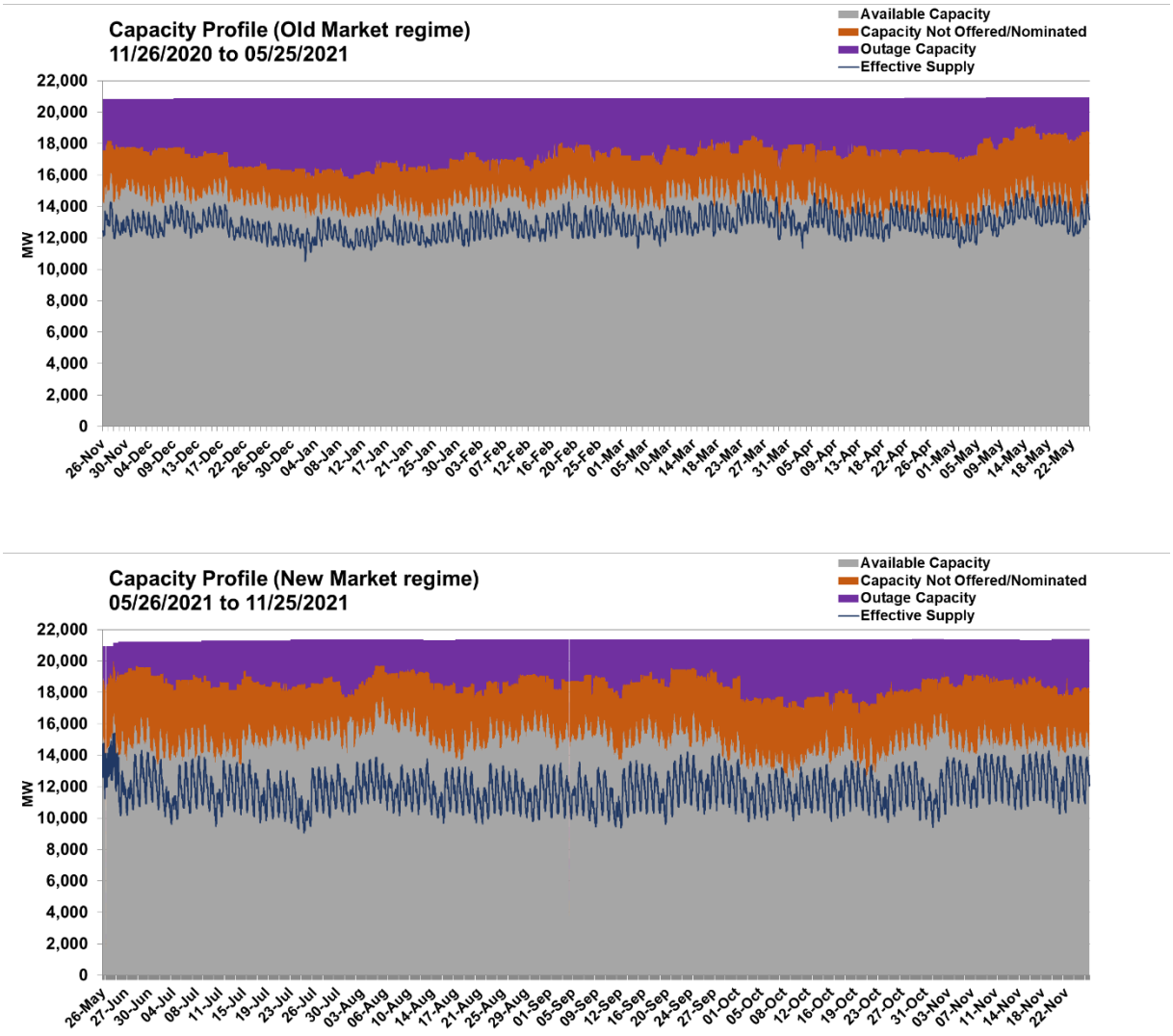
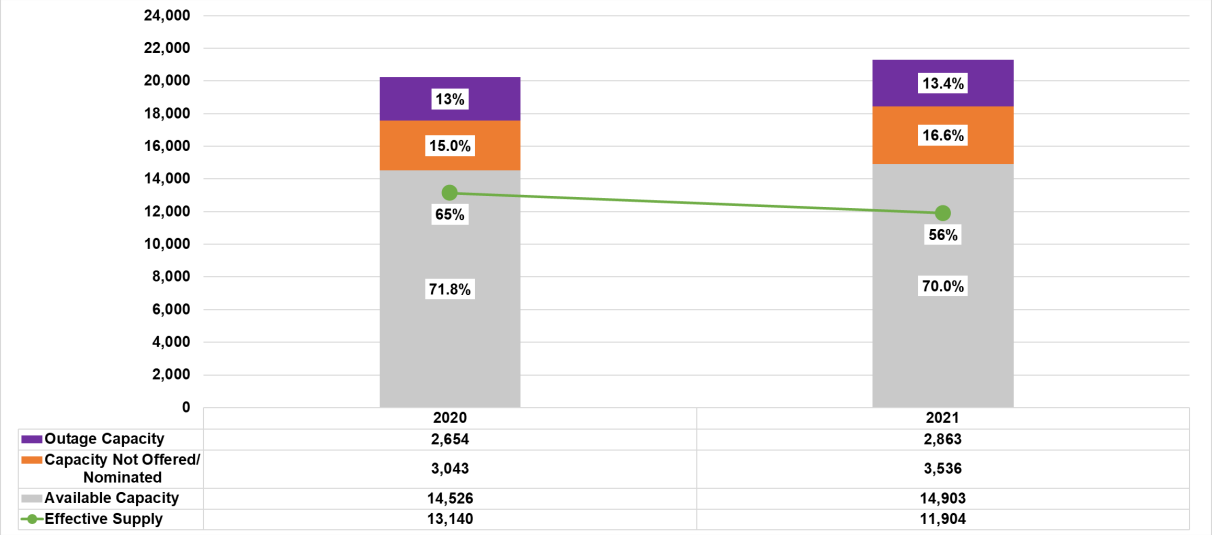


Figure 16. Capacity Profile by Component - 2021

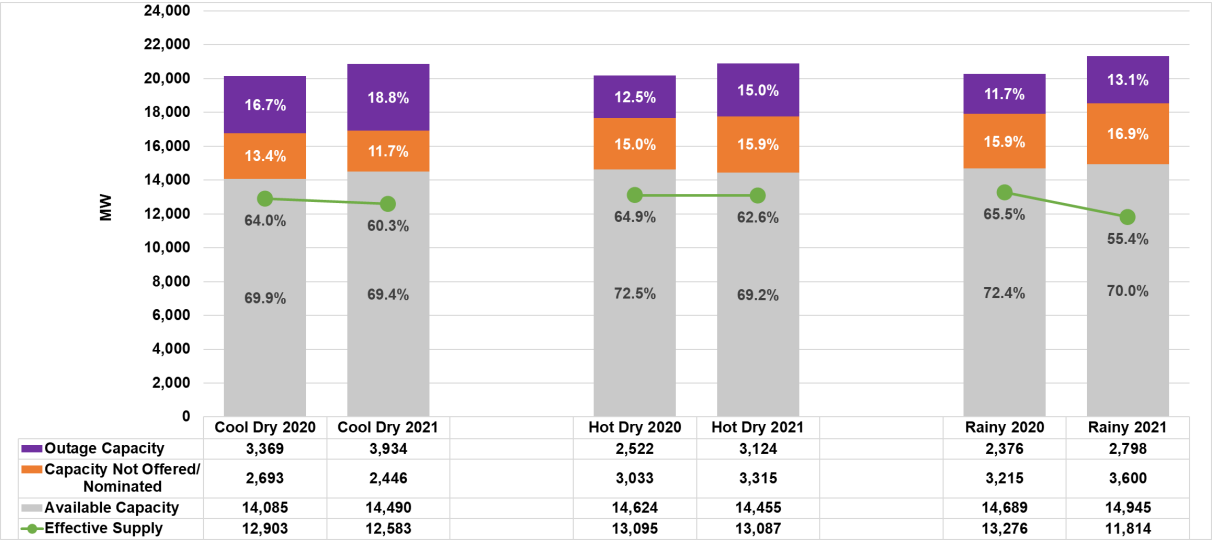
accounted for in the effected supply. Likewise included is the scheduled output of Malaya plant when it is called to run as Must Run Unit (MRU).



	2020	2021
Outage Capacity	2,654	2,863
Capacity Not Offered/ Nominated	3,043	3,536
Available Capacity	14,526	14,903
Effective Supply	13,140	11,904

Figure 17. Capacity Profile by Component - Yearly, 2020 to 2021

- Outage capacities were consistently the highest during the cool dry season taking advantage of a generally low demand in the months of December to February.
- Meanwhile, capacities not offered and nominated had a high level during the hot dry season as the summer months rendered a high level of unavailable capacities from hydro plants.
- Subsequently, Coal power plants contributed to the increased in the capacities not offered and nominated due to high level of outage capacity of Coal plants during Rainy season.



	Cool Dry 2020	Cool Dry 2021	Hot Dry 2020	Hot Dry 2021	Rainy 2020	Rainy 2021
Outage Capacity	3,369	3,934	2,522	3,124	2,376	2,798
Capacity Not Offered/ Nominated	2,693	2,446	3,033	3,315	3,215	3,600
Available Capacity	14,085	14,490	14,624	14,455	14,689	14,945
Effective Supply	12,903	12,583	13,095	13,087	13,276	11,814

Figure 18. Capacity Profile by Component, 2020 to 2021 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 marginal 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.

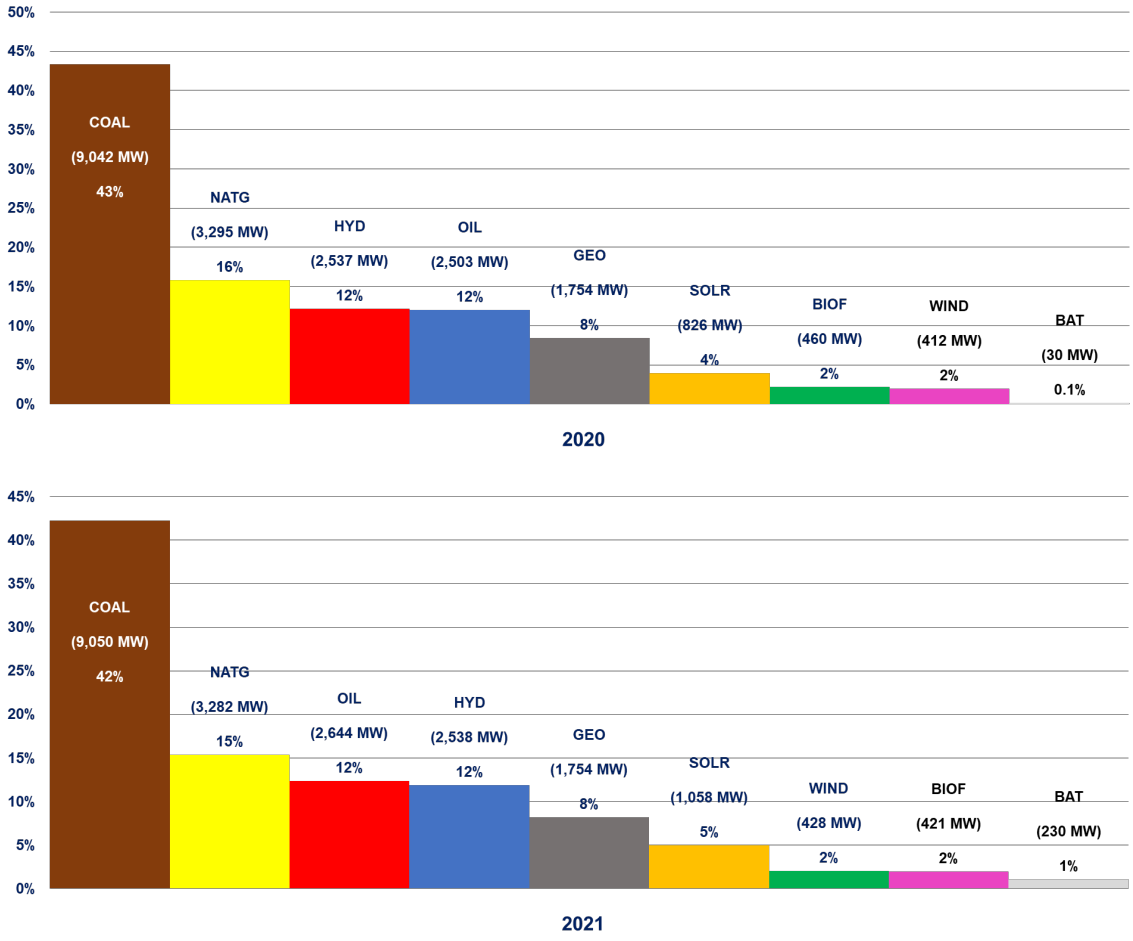


Figure 19. Capacity Mix, 2020 to 2021

- Coal plants in the Luzon region comprised more than half of the entire generation mix in the grid despite having only around 42 percent share in registered capacity.
- A similar reliance is observed with natural gas plants where the share in generation mix outnumbered that of the capacity mix.

- The opposite trend was manifested by hydro plants as majority of these capacities are offered at the higher price spectrum and are likewise dependent on the availability of water.

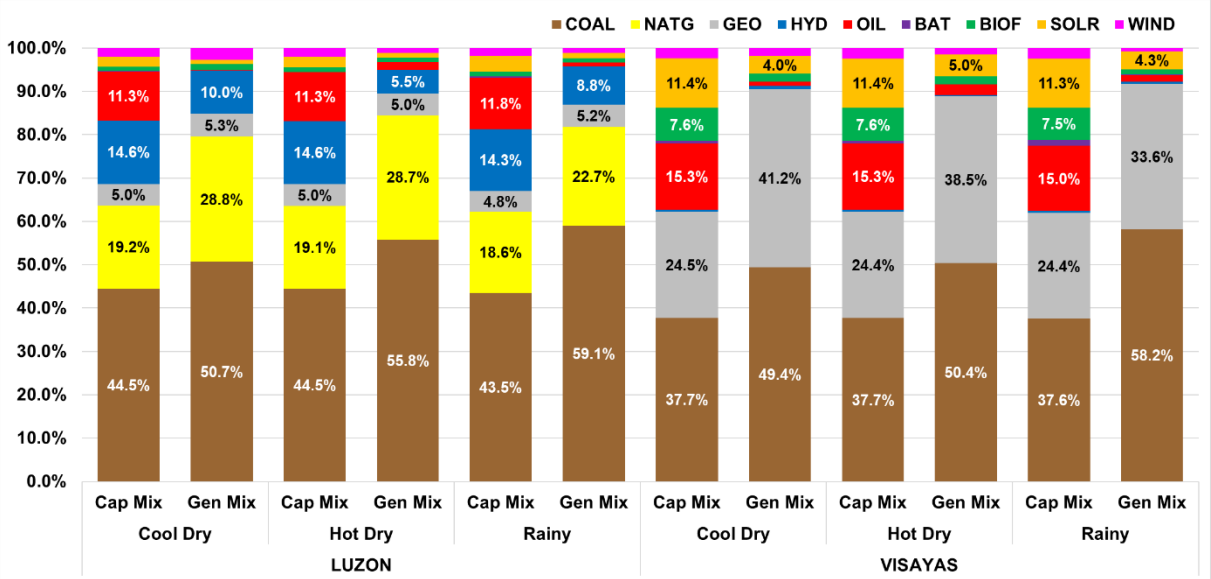
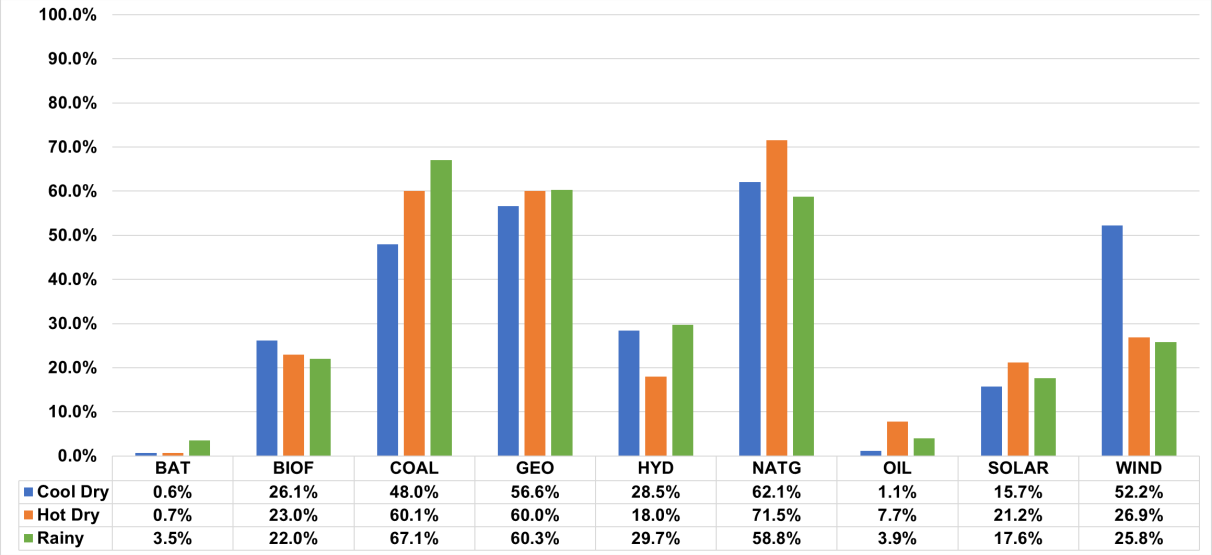


Figure 20. Capacity Mix vs Generation Mix - Luzon, 2020 Seasons

iii. Dispatch Factor[8]

- While only second in rank in terms of capacity and generation mix, natural gas plants posted the highest dispatch factor all throughout the seasons consistent to their based load characteristics.
- Geothermal and coal plants had similar dispatch factors of roughly 48-67 percent for each season, indicating that more than half of their total capacities were being dispatched for the entire billing year.
- As expected, hydro plants saw low dispatch factor during the hot dry season in line with the reduction in water supply from rivers and reservoirs to which solar, wind and biomass power plants, on the other hand, were able to capitalize.
- Wind power plants, similar to last year, consistently showed high dispatch factor during the cool dry season.

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

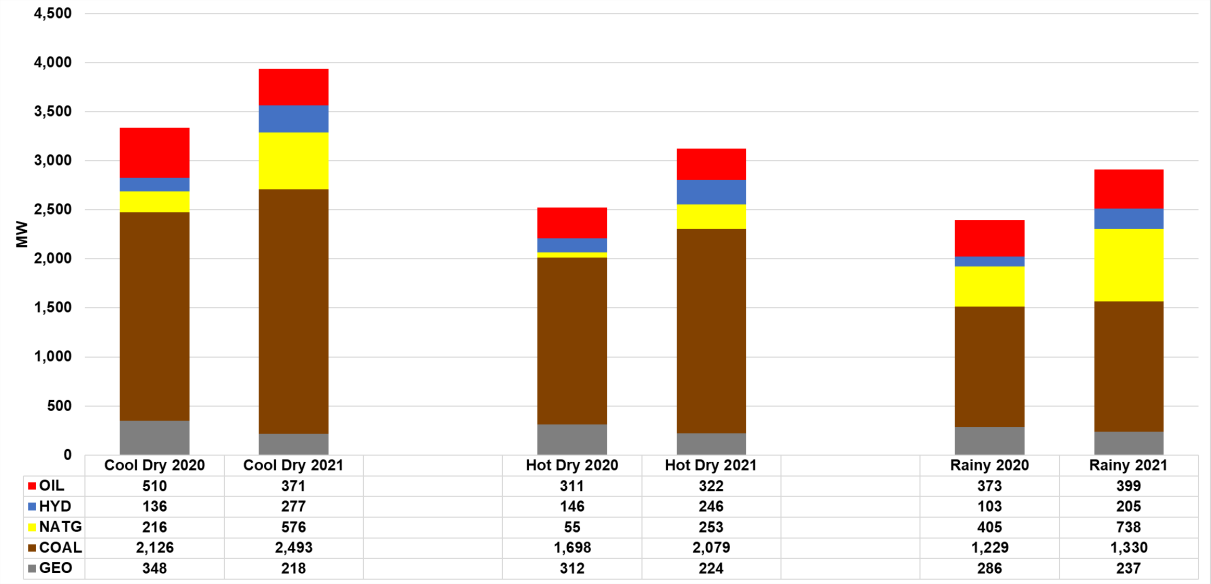


	BAT	BIOF	COAL	GEO	HYD	NATG	OIL	SOLAR	WIND
Cool Dry	0.6%	26.1%	48.0%	56.6%	28.5%	62.1%	1.1%	15.7%	52.2%
Hot Dry	0.7%	23.0%	60.1%	60.0%	18.0%	71.5%	7.7%	21.2%	26.9%
Rainy	3.5%	22.0%	67.1%	60.3%	29.7%	58.8%	3.9%	17.6%	25.8%

Figure 21. Dispatch Factor by Plant Type, 2021 Seasons

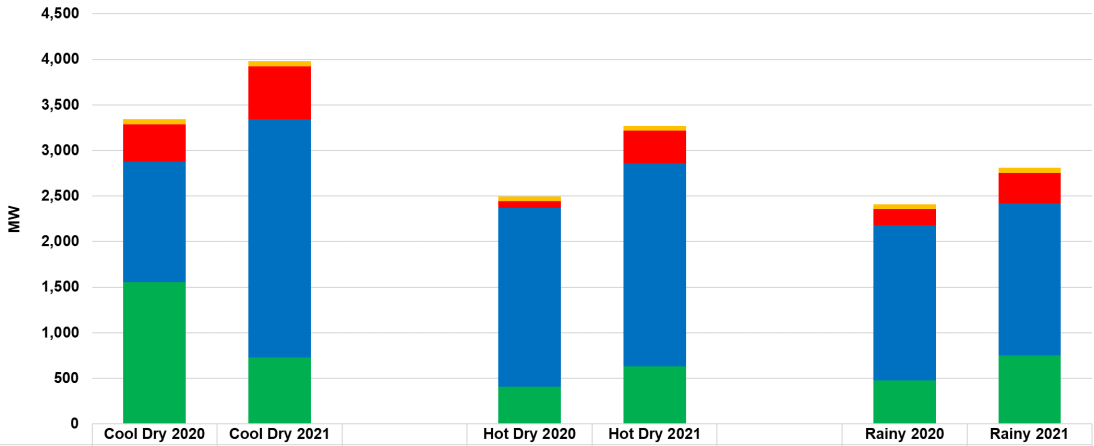
iv. Outage Capacity

- The annual average outage capacity has been generally observed to have increased from the previous year.
- Passage of tropical storms resulted in significant forced outages over the course of the year. The onslaught of Typhoon Ulysses, for instance, rendered several plants on outage in December 2020 and January 2021 setting record level averages since December 2019.
- Coal plants consistently dominated the outage mix heavily affecting the grid's power supply.
- Although the level of planned outages only hovered at around the 500 MW mark, forced outages accounted for the largest share whole year round.
- Each season recorded the following average hourly level of outage:
    - Cool Dry – 3,978 MW; Hot Dry – 3,270 MW; Rainy – 2,808 MW



	Cool Dry 2020	Cool Dry 2021	Hot Dry 2020	Hot Dry 2021	Rainy 2020	Rainy 2021
OIL	510	371	311	322	373	399
HYD	136	277	146	246	103	205
NATG	216	576	55	253	405	738
COAL	2,126	2,493	1,698	2,079	1,229	1,330
GEO	348	218	312	224	286	237

Figure 22. Outage Capacity by Plant Type, 2021 Seasons



	Cool Dry 2020	Cool Dry 2021	Hot Dry 2020	Hot Dry 2021	Rainy 2020	Rainy 2021
Deactivated Shutdown	55	55	55	55	55	55
Maintenance Outage	407	582	73	352	173	333
Forced Outage	1,329	2,610	1,960	2,229	1,704	1,665
Planned Outage	1,553	731	408	634	478	755

Figure 23. Outage Capacity by Outage Category, 2021 Seasons

- Of the list of major power plants (> 100 MW) with total outage duration of more than a month, 17 out of 22 were coal-fired thermal power plants with forced outage being the main driver.
- More than half or 58 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), 2021

Plant/Unit Name	Plant Type	MPG	Capacity (MW)	Age	Total No. of Outage Days			Total
					Forced	Maintenance	Planned	
Calaca 1	COAL	SMPC	300	38	12.0	9.9	50.2	72.1
Calaca 2	COAL	SMPC	300	38	356.6			356.6
GN Power 1	COAL	AP	316	9	320.9			320.9
GN Power 2	COAL	AP	316	9	14.3		46.5	60.8
GNP Dinginin 1	COAL	AP	668	2	31.5			31.5
Kalayaan 4	HYD	PSALM	180	18	117.4			117.4
Kepco Salcon 1	COAL	SPC	103	12	4.7		26.2	30.9
Kepco Salcon 2	COAL	SPC	103	11	31.1		170.9	202.0
Malaya 1	OIL	PSALM	300	47	364.0			364.0
Masinloc 3	COAL	SMC	335	3	85.5			85.5
Pagbilao 1	COAL	AP	382	26	0.3	159.0		159.3
Pagbilao 3	COAL	AP	420	5	1.8	4.5	34.8	41.1
PEDC 3	COAL	GBPC	150	6	5.5	1.0	30.5	37.0
San Gabriel	NATG	FGC	420	6	84.1	3.3		87.4
SLPGC 2	COAL	SMPC	150	7	41.0			41.0
SLTEC 2	COAL	AC	122.9	7	215.8	2.9		218.7
Sta. Rita 1	NATG	FGC	257.3	22	162.4		3.2	165.7
Sta. Rita 3	NATG	FGC	265.5	21	1.1	50.6		51.7
Sual 1	COAL	SMC	647	23	1.8	40.6		42.4
Sual 2	COAL	SMC	647	23	167.2	17.6		184.8
THVI 1	COAL	AP	169	5	24.9		22.6	47.5
THVI 2	COAL	AP	169	5	162.2		30.2	192.4

- Middle-aged generator units (21-50 years) noted long average forced outage days for the year.
- Plants aged 1-10 and 31-40 years came close at an average length of 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 0.4 days.

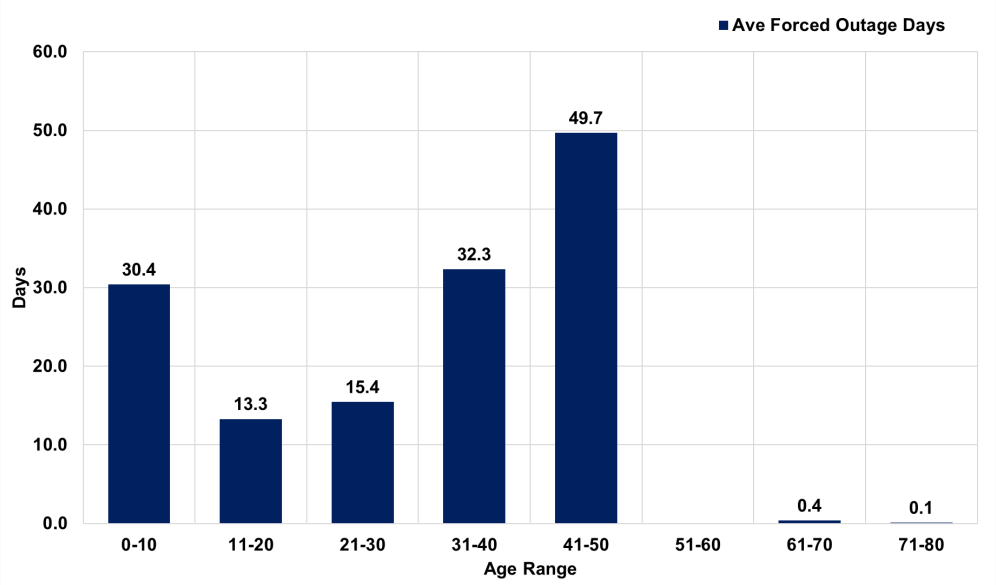


Figure 24. Average Forced Outage Days per Age Range of Generator Units, 2021

- Based on size of plants, large plants (> 100 MW) have longer average forced and planned outage days than small plants (< 100 MW) same information holds true 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 2 days of maintenance outage, there is approximately 7 days of forced outage.
    - For every 1 day of planned outage, there is approximately 3 days of forced outages.

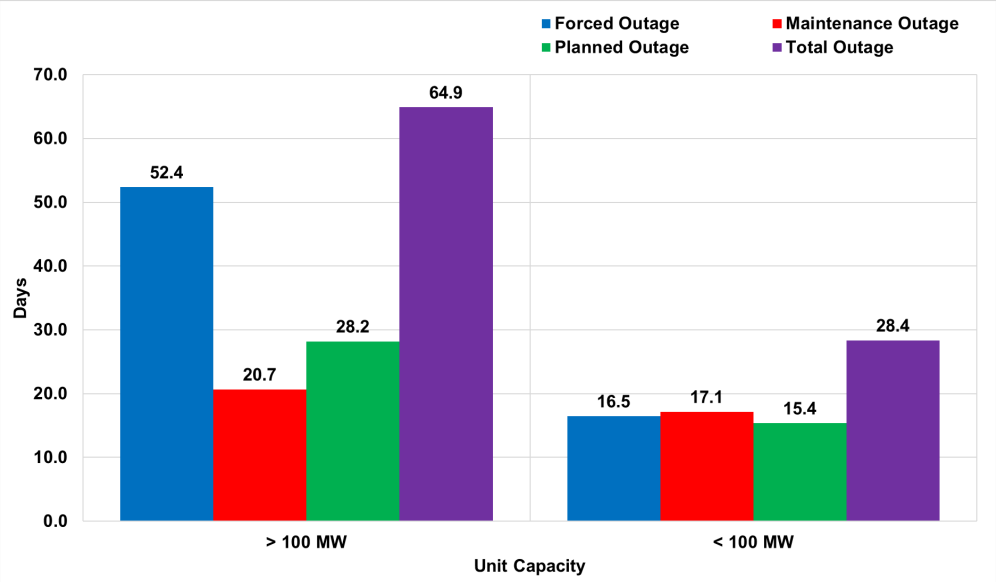


Figure 25. Average Outage Days Based on Unit Capacity, 2021

C. Demand

- The re-opening of the country's economic activities, notwithstanding the observance of the COVID-19 pandemic protocols, corresponded to a 7 percent annual increase in demand from 9,596 MW in 2020 to 10,292 MW in 2021.

Season	Demand- 2020	Demand- 2021	Percent Change
Cool Dry	9,536 MW	9,058 MW	4.9% decrease
Hot Dry	9,094 MW	10,441 MW (Peak demand at 13,598 MW on 17 May 2021)	14.8% increase
Rainy	9,878 MW	10, 345 MW (Peak demand at 13,676 MW on 28 May 2021)	4.7% increase

- Correlating the foregoing with the similar increase in Gross Domestic Product (GDP)[9] of 5.6 percent, it is estimated that a 1 MWh amounts to roughly PHP174,938 in economic value in 2021.
- Unlike in 2020 billing year where the hot dry season recorded the lowest average system demand across all seasons, summer period in 2021 showed a semblance of normalcy recording the highest average demand. Nevertheless, the rainy period demand level came very close to its summer counterpart.

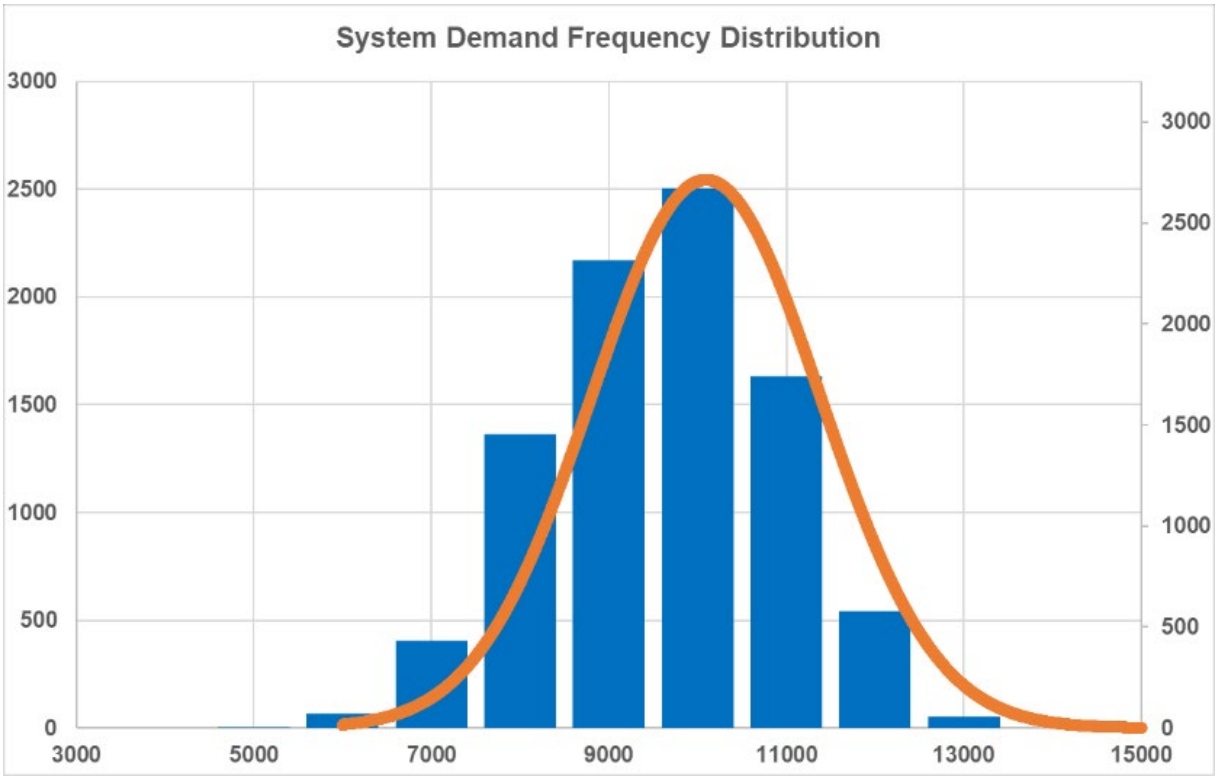
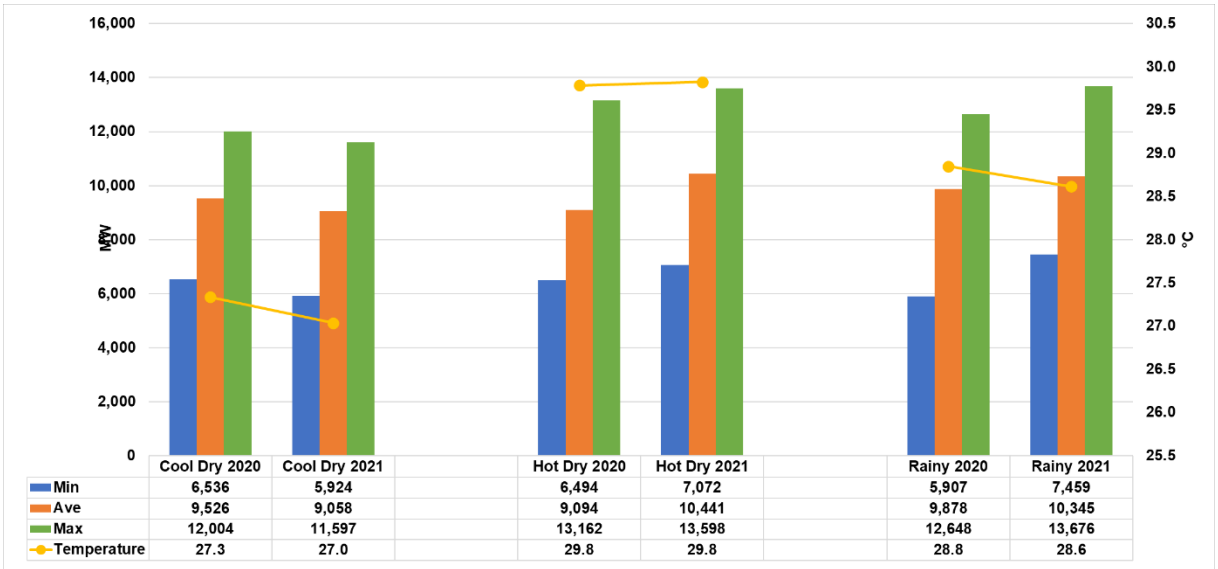


Figure 26. System Demand - Hourly, 2021

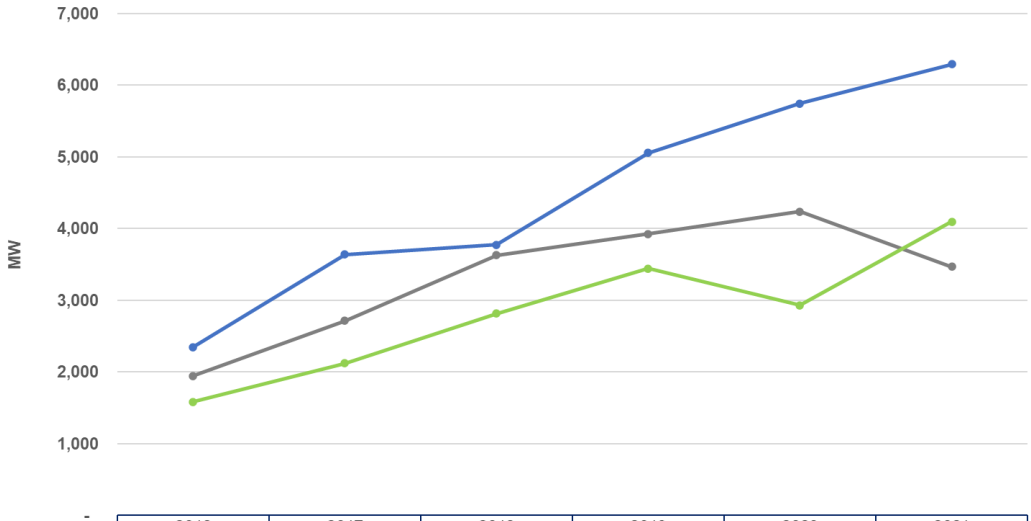
[9] Based on the Philippine Statistics Authority's (PSA) Annual National Accounts Data (2000-2019) at constant 2018 prices as of January 2021



	Cool Dry 2020	Cool Dry 2021	Hot Dry 2020	Hot Dry 2021	Rainy 2020	Rainy 2021
Min	6,536	5,924	6,494	7,072	5,907	7,459
Ave	9,526	9,058	9,094	10,441	9,878	10,345
Max	12,004	11,597	13,162	13,598	12,648	13,676
Temperature	27.3	27.0	29.8	29.8	28.8	28.6

Figure 27. Demand and Temperature, 2020 to 2021 Seasons

- Using 2015 as the baseline, market data shows that there is sufficient margin between registered capacity and system demand across the 6 year horizon.
- Effective supply declined due to the increase of outage capacity and ramp limited capacity during the implementation of the new market regime.
- Together with an increasing demand, the foregoing resulted in the supply margin plunging this year.



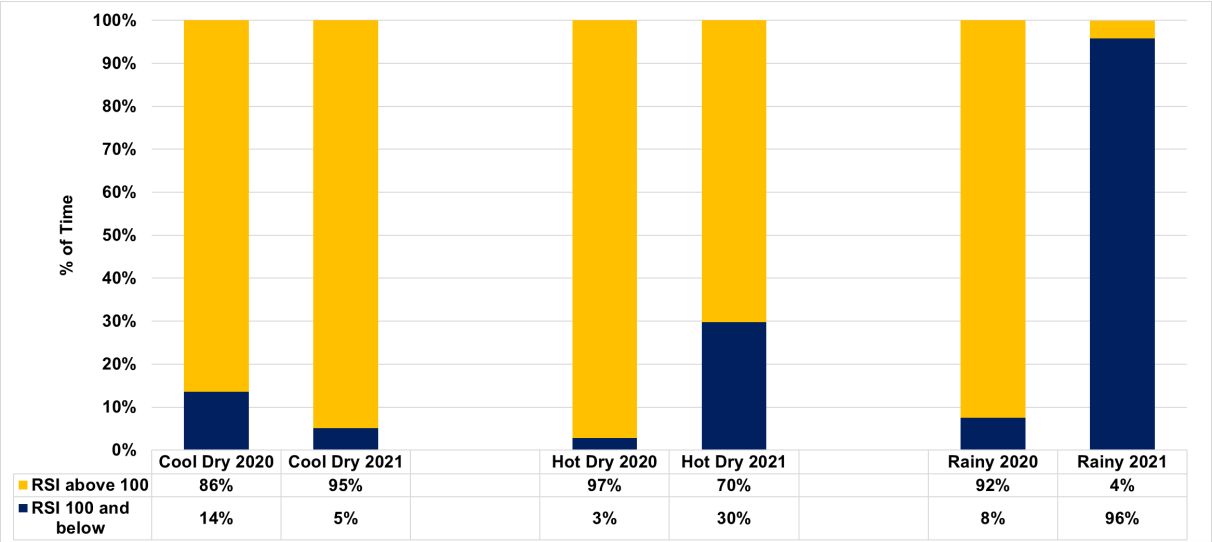
	2016	2017	2018	2019	2020	2021
Cumulative Reg Cap Growth	2,349	3,638	3,776	5,056	5,748	6,294
Cumulative Eff Supply Growth	1,946	2,718	3,628	3,926	4,238	3,472
Cumulative Demand Growth	1,583	2,124	2,818	3,443	2,933	4,097

Figure 28. Cumulative Growth Trend of Supply and Demand, 2016-2021

IV. Competitiveness Analysis

A. Residual Supply Index (RSI)[10]

- 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, RSI below 100 pose possibilities of power supply insufficiency which results in identification of pivotal suppliers in the market.
- In 2021, percentage of RSI above 100 went down to 70 percent during the hot dry season and 4 percent during the rainy season, further establishing the relationship of high market prices during low RSIs.
- Low market RSI below 100 led to an average of PHP5,603/MWh for the year.



	Cool Dry 2020	Cool Dry 2021	Hot Dry 2020	Hot Dry 2021	Rainy 2020	Rainy 2021
RSI above 100	86%	95%	97%	70%	92%	4%
RSI 100 and below	14%	5%	3%	30%	8%	96%

Figure 29. Market RSI, 2020 to 2021 Seasons

B. Pivotal Suppliers in Old and New market regime

- A total of 68 power plants were pivotal during the old market regime with 45 coming from Luzon and 23 from Visayas.
- With the high level of system demand and low supply level during the 5-minute market regime, this translated to a high number of pivotal suppliers.

[10] 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.

Table 5. Pivotal Supplies Old and New market regime

Plant	1-hour regime		Plant	5-minute regime	
	Frequency	% of Time		Frequency	% of Time
MASINLOC CFTPP	5073	2%	STA RITA NGPP	38,139	87%
STA RITA NGPP	5073	2%	MASINLOC CFTPP	37,752	86%
SMC LIMAY CFTPP	5073	2%	SUAL CFTPP	35,277	80%
ANGAT HEP	5073	2%	ILIJAN NGPP	29,650	67%
MAKBAN GPP	5073	2%	PAGBILAO CFTPP	27,600	63%
BAUANG DPP	5073	2%	SMC LIMAY CFTPP	27,151	62%
PAGBILAO CFTPP	5073	2%	SBPLC CFTPP	19,860	45%
ILIJAN NGPP	5073	2%	SAN LORENZO NGPP	19,104	43%
LIMAY CCGT	5073	2%	PAGBILAO 3 CFTPP	17,239	39%
SUBIC DPP	5073	2%	GNP DINGININ CFTPP	16,098	37%

C. Market Share and Herfindahl-Hirschman Index (HHI)[11]

- Across all seasons, the WESM remained to be dominated by the 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.

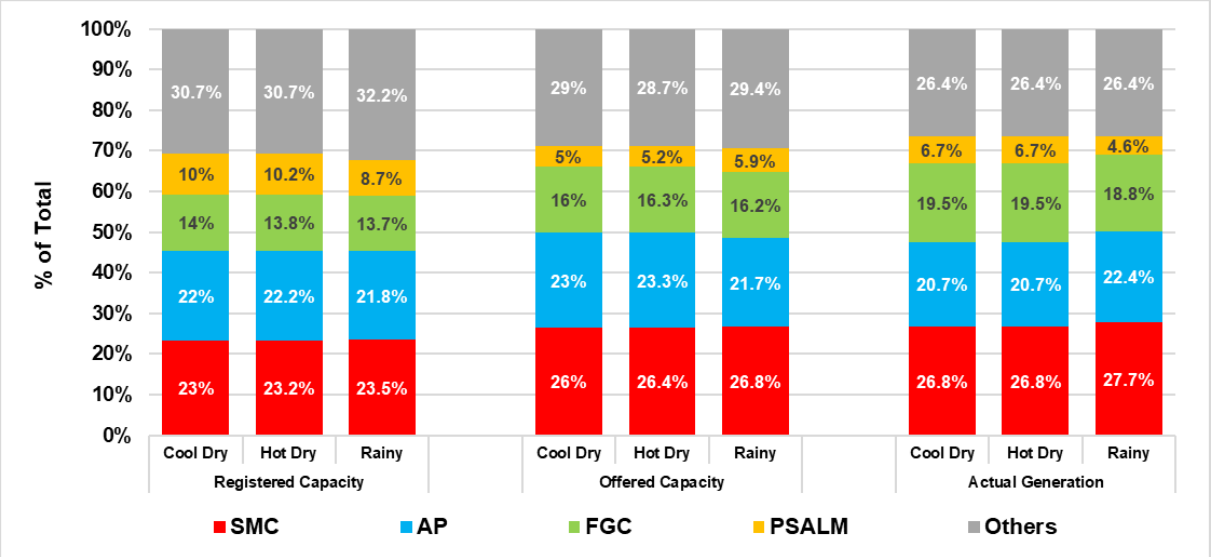
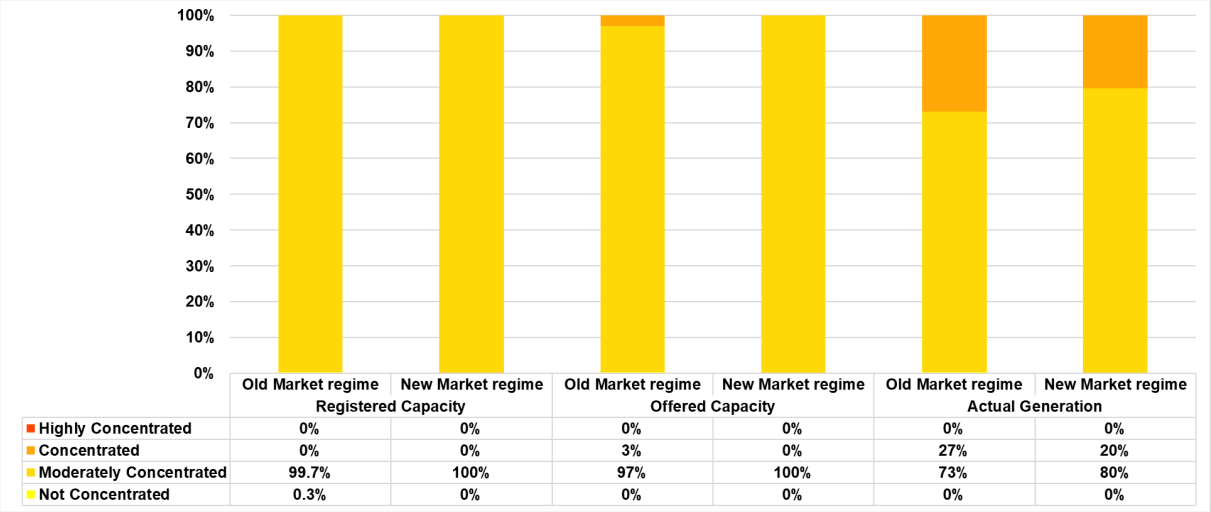


Figure 30. Market Share, 2021 Seasons

[11] 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.

- Correspondingly, the hourly HHIs indicated a moderately concentrated market based on registered capacities for all hours in 2021.
- Instances of a concentrated market resulted when measured in terms of offered capacity and actual generation which signaled a deviation from an ideal market.



	Registered Capacity		Offered Capacity		Actual Generation	
	Old Market regime	New Market regime	Old Market regime	New Market regime	Old Market regime	New Market regime
Highly Concentrated	0%	0%	0%	0%	0%	0%
Concentrated	0%	0%	3%	0%	27%	20%
Moderately Concentrated	99.7%	100%	97%	100%	73%	80%
Not Concentrated	0.3%	0%	0%	0%	0%	0%

Figure 31. Herfindahl-Hirschman Index, 2021 Seasons

V. Generator Trading Behavior

- Difference Calculation[12] 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.
- Consistent with last year, geothermal plants were one of the cheapest of all resource types along with hydro 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.
- Noting the cheaper offered prices of Coal and Natural gas which averaged at below PHP2,000/MWh, the grid relied on this baseload power plants, causing them to be dispatched more frequent.

[12] 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.

Table 6. Average Offer Prices Based on Plant Type, 2020 and 2021 Seasons

Plant Type	Old Market regime			New Market regime		
	ARP	ASP	% Diff	ARP	ASP	% Diff
Battery	17,100	32,000	87%	17,100	17,100	87%
Coal	-1,915	-3,177	-66%	841	1,310	-582%
Geothermal	-1,033	-1,017	2%	-53	-604	-454%
Hydro	8,038	11,776	47%	9,024	12,833	-1739%
Natural Gas	-1,032	716	169%	-162	477	47%
Oil	24,475	22,972	-6%	17,940	22,455	25%

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

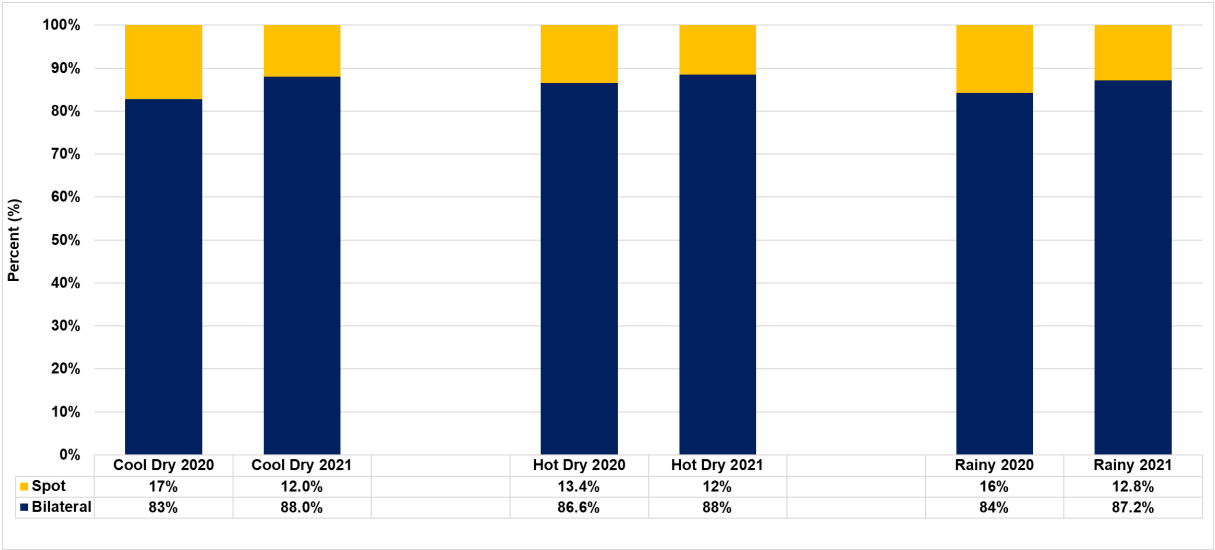
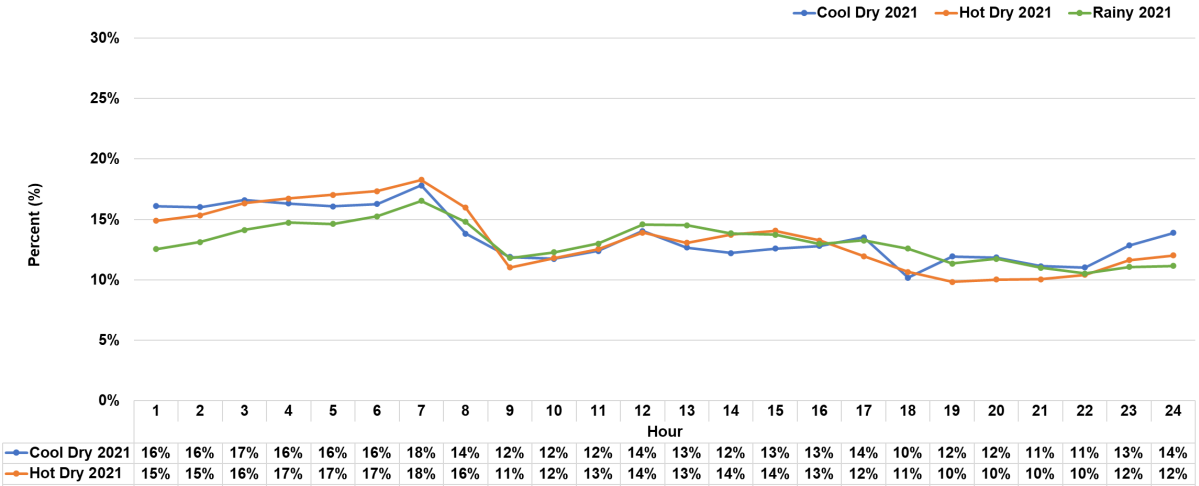


Figure 32. Spot Market Exposure, 2020 to 2021 Seasons

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



	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 2021	16%	16%	17%	16%	16%	16%	18%	14%	12%	12%	12%	14%	13%	12%	13%	13%	14%	10%	12%	12%	11%	11%	13%	14%
Hot Dry 2021	15%	15%	16%	17%	17%	17%	18%	16%	11%	12%	13%	14%	13%	14%	14%	13%	12%	11%	10%	10%	10%	10%	12%	12%
Rainy 2021	13%	13%	14%	15%	15%	15%	17%	15%	12%	12%	13%	15%	15%	14%	14%	13%	13%	13%	11%	12%	11%	11%	11%	11%

Figure 33. Hourly Generator Spot Market Exposure, 2021 Seasons

B. Energy Trading Amount (ETA)[13] 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) 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 as these plants are highly covered by BCQ.
- Millennium Energy, Inc. (MEI) had only 1 percent of actual generation share but resulted to a 9 percent TTA share given that the portfolio consists of relatively more expensive oil-based plants.

[13] The Energy 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 ETA share of a major participant group is measured as a percentage of its ETA over the ETA of all participants during the period.

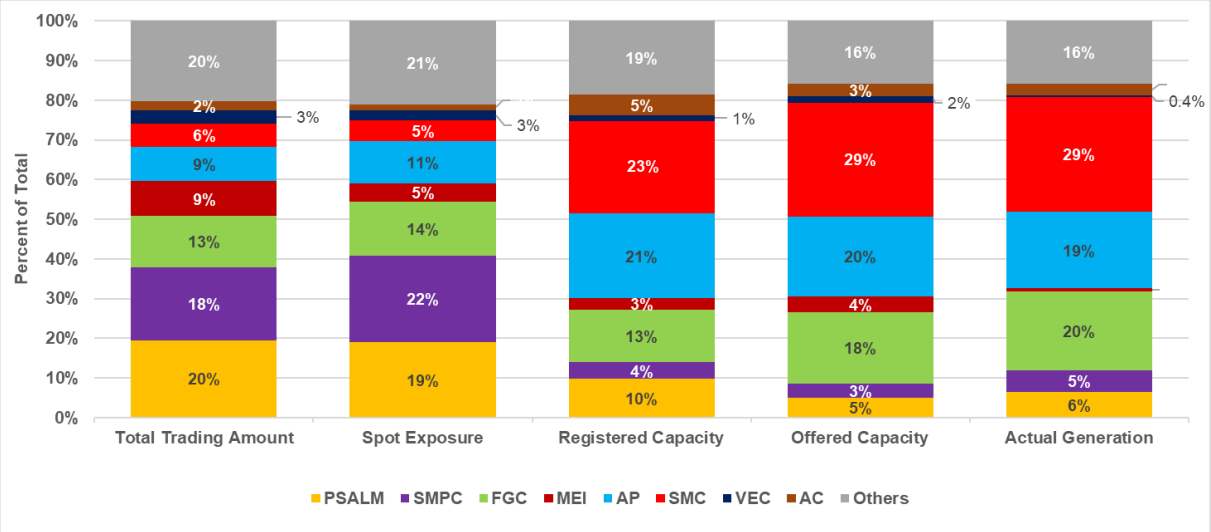


Figure 34. Total Trading Amount and Spot Exposure, 2021

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	Total
LUZON	COAL	ANDA 1	72	09-Jan-21	28-Jan-21	19.02	Planned Outage	Maintenance Outage until 29 January 2021.(GOP).	01 September, 2016	456
LUZON	COAL	ANDA 1	72	02-Jun-21	02-Jun-21	0.14	Forced Outage	Affected by the tripping of Mexico-Clark 69kV line 2	01 September, 2016	3
LUZON	COAL	APEC 1	52	26-Feb-21	26-Feb-21	0.03	Forced Outage	Affected by the tripping of Mexico-Clark 69kV line 1.	01 July, 2006	1
LUZON	COAL	APEC 1	52	21-Mar-21	24-Mar-21	3.20	Forced Outage	Reported tube leak.	01 July, 2006	77
LUZON	COAL	APEC 1	52	16-Jun-21	16-Jun-21	0.02	Forced Outage	Tripped simultaneously with the activation of Batangas SIPS.	01 July, 2006	1
LUZON	COAL	GN Power 1	316	27-Nov-20	28-Nov-20	0.70	Forced Outage	Rotor earth fault indication.	01 May, 2013	16
LUZON	COAL	GN Power 1	316	08-Jan-21			Forced Outage	Boiler tube leak.	01 May, 2013	4038
LUZON	COAL	GN Power 2	316	20-Mar-21	05-May-21	46.52	Planned Outage	Maintenance Outage	01 May, 2013	1117
LUZON	COAL	GN Power 2	316	02-Mar-21	04-Mar-21	2.58	Forced Outage	Emergency shutdown due to hotspot at generator transformer.	01 May, 2013	62
LUZON	COAL	GN Power 2	316	05-May-21	06-May-21	0.90	Forced Outage	Tripped while on the process of load dstabilization from start-up.	01 May, 2013	22
LUZON	COAL	GN Power 2	316	07-May-21	10-May-21	2.26	Forced Outage	IDF high vibration.	01 May, 2013	54
LUZON	COAL	GN Power 2	316	01-Jun-21	09-Jun-21	8.55	Forced Outage	Emergency Shutdown due to boiler tube leak	01 May, 2013	206
LUZON	COAL	Masinloc 1	315	04-Dec-20	04-Dec-20	0.39	Forced Outage	Emergency trip due to AVR trouble	01 June, 1998	9
LUZON	COAL	Masinloc 2	344	06-Feb-21	06-Feb-21	0.38	Forced Outage	Turbine tripped	01 June, 1998	9
LUZON	COAL	Masinloc 2	344	06-Feb-21	06-Feb-21	0.04	Forced Outage	Tripped due to turbine windage high temperature	01 June, 1998	1
LUZON	COAL	Masinloc 2	344	10-Feb-21	12-Feb-21	2.58	Forced Outage	ON EMERGENCY SD DUE TO GEN. TRANSFORMER TROUBLE	01 June, 1998	62
LUZON	COAL	Masinloc 2	344	08-May-21	09-May-21	0.97	Forced Outage	Emergency shutdown due to de-railed drag chain conveyor.	01 June, 1998	23
LUZON	COAL	Masinloc 2	344	15-Jun-21	15-Jun-21	0.05	Forced Outage	Tripped at 39MW load.	01 June, 1998	2
LUZON	COAL	Masinloc 3	335	24-Nov-20	16-Feb-21	83.75	Forced Outage	Excitation Trouble	01 December, 2020	1982
LUZON	COAL	Masinloc 3	335	16-Feb-21	17-Feb-21	0.53	Forced Outage	Turbine tripped due to LP Exhaust temperature high.	01 December, 2020	13
LUZON	COAL	Masinloc 3	335	18-Feb-21	20-Feb-21	2.35	Forced Outage	DUE TO ESP BOILER FEED PUMP SUCTION STRAINER LEAK	01 December, 2020	57
LUZON	COAL	SMC 2	150	14-Dec-20	08-Jan-21	24.52	Planned Outage	Maintenance Outage until 04 January 2021	01 September, 2017	589
LUZON	COAL	SMC 3	150	21-Dec-20	21-Dec-20	0.28	Forced Outage	Tripped at 150MW load. System Frequency is 59.51hz.	01 March, 2018	7
LUZON	COAL	SMC 3	150	22-Mar-21	23-Mar-21	0.72	Forced Outage	Back flow of fuel gas in feeder C.	01 March, 2018	18
LUZON	COAL	SMC 3	150	21-Apr-21	21-Apr-21	0.22	Forced Outage	Tripped with 120MW load.	01 March, 2018	5
LUZON	COAL	SMC 4	150	22-Jan-21	22-Jan-21	0.26	Forced Outage	Tripped due to vacuum decay	01 July, 2019	6
LUZON	COAL	SMC 4	150	17-Feb-21	17-Feb-21	0.09	Forced Outage	High steam drum level	01 July, 2019	2
LUZON	COAL	SMC 4	150	25-Dec-20	18-Jan-21	23.77	Maintenance Outage	Planned Outage (GOP).	01 July, 2019	570
LUZON	COAL	Sual 1	647	04-Feb-21	05-Feb-21	0.21	Forced Outage	Cooling Water System trouble. Turbine side	01 October, 1999	5
LUZON	COAL	Sual 1	647	20-Mar-21	22-Mar-21	1.62	Forced Outage	Boiler tube leak.	01 October, 1999	39
LUZON	COAL	Sual 1	647	18-Dec-20	28-Jan-21	40.60	Maintenance Outage	To rectify erratic movement of HP turbine governing valve of HPGV 1.(RECLASSIFIED FROM FORCE. OMC OUTAGE)(RECLASSIFIED FROM FORCE. OMC OUTAGE	01 October, 1999	974
LUZON	COAL	Sual 2	647	16-Sep-20	12-May-21	237.59	Forced Outage	Tripped due to high turbine vibration	01 October, 1999	4012
LUZON	COAL	Sual 2	647	16-May-21	02-Jun-21	17.58	Maintenance Outage	To correct the problem at pressure control valve of gland steam	01 October, 1999	422
LUZON	COAL	Calaca 1	300	25-Nov-20	15-Jan-21	51.19	Planned Outage	Maintenance Outage until 09 Jan 2021	01 September, 1984	1205
LUZON	COAL	Calaca 1	300	15-Jan-21	15-Jan-21	0.32	Forced Outage	Tripped with 136MW load.	01 September, 1984	8
LUZON	COAL	Calaca 1	300	15-Jan-21	16-Jan-21	0.32	Forced Outage	Tripped due to force draft fan trouble.	01 September, 1984	7
LUZON	COAL	Calaca 1	300	02-Feb-21	13-Feb-21	11.36	Forced Outage	Boiler tube leak.	01 September, 1984	273
LUZON	COAL	Calaca 1	300	27-Mar-21	05-Apr-21	9.92	Maintenance Outage	Maintenance Outage until 06 April 2021. For inspection and repair in coal and oil burner assemblies	01 September, 1984	238
LUZON	COAL	Calaca 2	300	03-Dec-20			Forced Outage	Generator stator earth fault	01 September, 1984	4911
LUZON	COAL	Pagbilao 1	382	29-Mar-21	29-Mar-21	0.18	Forced Outage	Turbine trip indication.	01 March, 1996	4
LUZON	COAL	Pagbilao 1	382	05-Apr-21	05-Apr-21	0.16	Forced Outage	Initial findings - tripped by under-frequency relay.	01 March, 1996	4
LUZON	COAL	Pagbilao 1	382	19-Jun-21			Maintenance Outage	Maintenance Outage	01 March, 1996	168
LUZON	COAL	Pagbilao 2	382	02-Jan-21	02-Jan-21	0.15	Forced Outage	Tripped at 160MW load. System Frequency at 59.298hz. Induced Draft Fan Trouble.	01 March, 1996	3
LUZON	COAL	Pagbilao 2	382	24-Jan-21	24-Jan-21	0.44	Forced Outage	Tripped with 351MW load	01 March, 1996	10
LUZON	COAL	Pagbilao 2	382	14-Feb-21	15-Feb-21	1.10	Forced Outage	Repair of Boiler Submersible Flight Conveyor	01 March, 1996	27
LUZON	COAL	Pagbilao 2	382	26-Feb-21	27-Feb-21	0.79	Forced Outage	Tripped at 313MW load. Root cause is still being investigated.	01 March, 1996	19
LUZON	COAL	Pagbilao 2	382	17-Mar-21	18-Mar-21	0.44	Forced Outage	Tripped due to Controller of air and gas drop 4-54.	01 March, 1996	11
LUZON	COAL	Pagbilao 2	382	02-Jun-21	05-Jun-21	3.28	Forced Outage	Emergency shutdown due to boiler tube leak	01 March, 1996	78
LUZON	COAL	Pagbilao 3	420	11-Dec-20	14-Jan-21	34.83	Planned Outage	Maintenance outage (GOP)	01 March, 2018	836
LUZON	COAL	Pagbilao 3	420	25-Nov-20	26-Nov-20	0.86	Forced Outage	Inspection and repair of governor valve	01 March, 2018	12
LUZON	COAL	Pagbilao 3	420	26-Nov-20	26-Nov-20	0.09	Forced Outage	Tripped at 10MW load.	01 March, 2018	2
LUZON	COAL	Pagbilao 3	420	03-Apr-21	03-Apr-21	0.65	Forced Outage	Replacement of Main Turbine ICV LH Servo Valve.	01 March, 2018	16
LUZON	COAL	Pagbilao 3	420	16-May-21	17-May-21	0.56	Forced Outage	Main Steam Valve (MSV) failed to open.	01 March, 2018	14
LUZON	COAL	Pagbilao 3	420	13-Mar-21	17-Mar-21	4.47	Maintenance Outage	Inspection and repair of main turbine governor valve 3	01 March, 2018	108
LUZON	COAL	QPPL	460	20-Jan-21	31-Jan-21	10.76	Planned Outage	Maintenance Outage until 30 January 2021.	01 May, 2000	259
LUZON	COAL	QPPL	460	09-Jan-21	10-Jan-21	0.44	Forced Outage	Boiler drum level high.	01 May, 2000	11
LUZON	COAL	SBPL	455	28-Feb-21	15-Mar-21	14.11	Planned Outage	Maintenance Outage.	01 October, 2019	339
LUZON	COAL	SBPL	455	19-Jan-21	20-Jan-21	1.02	Forced Outage	Boiler Bottom Ash Handling Unit Trouble	01 October, 2019	25
LUZON	COAL	SLPGC 1	150	02-May-21	23-May-21	20.97	Forced Outage	Emergency shutdown due to boiler tube leak	01 July, 2016	503
LUZON	COAL	SLPGC 2	150	30-Dec-20	15-Jan-21	15.86	Forced Outage	Emergency shutdown due to boiler tube leak.	01 July, 2016	380
LUZON	COAL	SLPGC 2	150	21-Apr-21	15-May-21	24.86	Forced Outage	Boiler tube leak.	01 July, 2016	596
LUZON	COAL	SLPGC 2	150	16-Jun-21	16-Jun-21	0.31	Forced Outage	Tripped from 150MW load due to activation of Batangas SIPS.	01 July, 2016	8
LUZON	COAL	SLTEC 1	121	24-Apr-21	25-Apr-21	1.38	Forced Outage	Emergency shutdown due to primary air fan problem.	01 April, 2015	33
LUZON	COAL	SLTEC 1	121	16-Jun-21	17-Jun-21	0.56	Forced Outage	Tripped from 121MW load due to activation of Batangas SIPS.	01 April, 2015	14
LUZON	COAL	SLTEC 1	121	09-Apr-21	11-Apr-21	2.14	Maintenance Outage	In preparation for the pre-arranged shutdown of Calaca-Salong 230kV line on 10 April 2021.	01 April, 2015	51
LUZON	COAL	SLTEC 2	122.9	25-Nov-20	13-Dec-20	17.53	Forced Outage	Turbine bearing vibration high	01 February, 2016	417
LUZON	COAL	SLTEC 2	122.9	13-Dec-20	13-Dec-20	0.05	Forced Outage	Manually tripped due to turbine valve trouble.	01 February, 2016	3
LUZON	COAL	SLTEC 2	122.9	28-Feb-21	08-Mar-21	8.11	Forced Outage	Emergency shutdown due to boiler tube leak.	01 February, 2016	195
LUZON	COAL	SLTEC 2	122.9	30-Apr-21	30-May-21	30.38	Forced Outage	Tripped while on the process of de-loading due to steam leak at Heat Recovery Area front wall	01 February, 2016	729
LUZON	COAL	SLTEC 2	122.9	18-Jun-21			Forced Outage	Boiler tube leak.	01 February, 2016	188
LUZON	COAL	SLTEC 2	122.9	09-Apr-21	12-Apr-21	2.93	Maintenance Outage	In preparation for the pre-arranged shutdown of Calaca-Salong 230kV line on 10 April 2021.	01 February, 2016	70
LUZON	GEO	Bacman 1	60	14-Jan-21	15-Jan-21	1.05	Forced Outage	Tripped with 59MW load.	01 September, 1993	25
LUZON	GEO	Bacman 1	60	31-Jan-21	01-Feb-21	0.18	Forced Outage	Affected by Daraga-Ligao 69kV Line tripping.	01 September, 1993	4
LUZON	GEO	Bacman 1	60	23-Feb-21	23-Feb-21	0.51	Forced Outage	High winding temperature	01 September, 1993	13
LUZON	GEO	Bacman 1	60	10-Apr-21	11-Apr-21	0.84	Forced Outage	Undervoltage indication during Naga T03 3PH fault tripping.	01 September, 1993	20
LUZON	GEO	Bacman 1	60	19-Apr-21	19-Apr-21	0.14	Forced Outage	Tripped at 58MW. Cause of tripping still under investigation.	01 September, 1993	4
LUZON	GEO	Bacman 2	60	14-Jan-21	14-Jan-21	0.06	Forced Outage	Tripped with 58MW load.	01 September, 1993	1
LUZON	GEO	Bacman 2	60	31-Jan-21	01-Feb-21	0.13	Forced Outage	Affected by Daraga-Ligao 69kV Line tripping.	01 September, 1993	3
LUZON	GEO	Bacman 2	60	10-Apr-21	11-Apr-21	0.78	Forced Outage	Undervoltage indication during Naga T03 3PH fault tripping.	01 September, 1993	19
LUZON	GEO	Bacman 2	60	19-Apr-21	19-Apr-21	0.29	Forced Outage	Tripped at 58MW. Cause of tripping still under investigation.	01 September, 1993	7
LUZON	GEO	Makban 1	63.2	17-Feb-21	26-Feb-21	8.55	Forced Outage	Steam supply diverted to Unit 2.	01 April, 1979	205
LUZON	GEO	Makban 1	63.2	18-Mar-21	18-Jun-21	91.74	Forced Outage	Steam supply diverted to Unit 2	01 April, 1979	2201
LUZON	GEO	Makban 2	63.2	03-Feb-21	17-Feb-21	13.96	Forced Outage	Steam diverted to Makban 1	01 April, 1979	335
LUZON	GEO	Makban 2	63.2	26-Feb-21	18-Mar-21	20.22	Forced Outage	Steam supply diverted to Unit 1	01 April, 1979	486
LUZON	GEO	Makban 3	63.2	14-Jan-21	15-Jan-21	0.06	Forced Outage	Tripped due to actuation of lockout relay.	01 April, 1979	2
LUZON	GEO	Makban 4	63.2	14-Jan-21	15-Jan-21	0.15	Forced Outage	Tripped due to actuation of lockout relay.	01 April, 1979	4
LUZON	GEO	Makban 4	63.2	29-Apr-21	29-Apr-21	0.09	Forced Outage	Tripped at 45MW load due to low vacuum pressure.	01 April, 1979	2
LUZON	GEO	Makban 4	63.2	11-May-21	11-May-21	0.12	Forced Outage	Emergency shutdown for troubleshooting of Main Transformer Buchholz relay	01 April, 1979	3
LUZON	GEO	Makban 6	55	11-Apr-13			Deactivated Shutdown	Conducted gas compressor test	01 April, 1979	5088
LUZON	GEO	Tiwi 1	60	15-Apr-21	01-May-21	15.94	Maintenance Outage	Supply steam to unit 2.(RECLASSIFIED FROM FORCE. OMC OUTAGE)	01 January, 1979	383
LUZON	GEO	Tiwi 2	60	01-Nov-20	14-Dec-20	43.31	Forced Outage	On houseload operation as contingency measures for incomming Typhoon ROLLY	01 January, 1979	442
LUZON	GEO	Tiwi 2	60	24-Dec-20	24-Dec-20	0.10	Forced Outage	Transformer breaker 8-01CB08TWAopen w.o indcation	01 January, 1979	3
LUZON	GEO	Tiwi 2	60	16-Mar-21	16-Mar-21	0.12	Forced Outage	Affected by Tripping of Tiwi A-Daraga 230kV Line and Naga-Tiwi C 230kV L2	01 January, 1979	3
LUZON	GEO	Tiwi 5	57	31-Oct-20	13-Jan-21	73.27	Forced Outage	On houseload operation as contingency measures for incomming Typhoon ROLLY	01 January, 1979	1154
LUZON	GEO	Tiwi 5	57	16-Mar-21	16-Mar-21	0.08	Forced Outage	Affected by tripping of Tiwi A when Daraga-Tiwi A 230kV Line synchronized in Daraga	01 January, 1979	2
LUZON	GEO	Tiwi 5	57	12-Feb-21	12-Feb-21	0.38	Maintenance Outage	Affected by the shutdown of Tiwi 5 Main Transformer in relation to commissioning of Tiwi C PCB 8-01CB24TWC	01 January, 1979	9
LUZON	GEO	Tiwi 6	57	01-Nov-20	03-Dec-20	31.76	Forced Outage	On houseload operation as contingency measures for incomming Typhoon ROLLY	01 January, 1979	168
LUZON	GEO	Tiwi 6	57	04-Dec-20	04-Dec-20	0.01	Forced Outage	False actuation of Hydrogen gas and seal oil system failure.	01 January, 1979	1
LUZON	GEO	Tiwi 6	57	24-Dec-20	24-Dec-20	0.17	Forced Outage	DUE TO SCRUBBER LEVEL HIGH C.O MR. BONGGAY	01 January, 1979	4
LUZON	GEO	Tiwi 6	57	04-Jan-21	05-Jan-21	0.05	Forced Outage	Low condenser vacuum pressure.(RECLASSIFIED FROM FORCE. OMC OUTAGE)	01 January, 1979	1
LUZON	GEO	Tiwi 6	57	16-Mar-21	16-Mar-21	0.32	Forced Outage	Affected by tripping of Tiwi A when Daraga-Tiwi A 230kV Line synchronized in Daraga Side	01 January, 1979	7
LUZON	GEO	Tiwi 6	57	28-Dec-20	30-Dec-20	2.40	Maintenance Outage	PGPC no steam supply	01 January, 1979	58
LUZON	GEO	Tiwi 6	57	07-Feb-21	07-Feb-21	0.37	Maintenance Outage	Maintenance Outage	01 January, 1979	9
LUZON	GEO	Tiwi 6	57	09-Jun-21	09-Jun-21	0.23	Maintenance Outage	Maintenance outage to facilitate repair of oil leak at excitation transformer	01 January, 1979	5
LUZON	HYD	Magat 1	97	12-Apr-21	12-Apr-21	0.06	Maintenance Outage	Customer(SNAP-M) request for shutdown to facilitate the repair of pipe leak(governor unloading pipe to accumulator).	01 August, 1983	1
LUZON	HYD	Magat 1	97	01-May-21	14-May-21	13.47	Maintenance Outage	APM	01 August, 1983	323
LUZON	HYD	Magat 2	97	01-May-21	14-May-21	13.50	Planned Outage	Maintenance outage as per GOMP	01 August, 1983	324
LUZON	HYD	Magat 2	97	24-Dec-20	24-Dec-20	0.08	Forced Outage	due tripping caused by Rotor Earth fault	01 August, 1983	2
LUZON	HYD	Magat 2	97	31-Jan-21	01-Feb-21	0.29	Forced Outage	Rotor earth fault.	01 August, 1983	7
LUZON	HYD	Magat 2	97	21-Mar-21	21-Mar-21	0.10	Forced Outage	Tripped simultaneously with the outage Santiago 69kV Bus 1.	01 August, 1983	2
LUZON	HYD	Magat 2	97	31-Mar-21	31-Mar-21	0.15	Forced Outage	Busted diode on excitation system.	01 August, 1983	3
LUZON	HYD	Magat 3	97	20-Mar-21	22-May-21	63.53	Planned Outage	Maintenance Outage	01 October, 1983	1524
LUZON	HYD	Magat 3	97	02-Jun-21	04-Jun-21	2.47	Forced Outage	Excitation Trouble	01 October, 1983	60
LUZON	HYD	Magat 4	97	03-Apr-21	03-Apr-21	0.12	Planned Outage	Planned maintenance outage	01 October, 1983	2
LUZON	HYD	Magat 4	97	13-Apr-21	07-May-21	24.64	Planned Outage	Maintenance outage under GOP.	01 October, 1983	591
LUZON	HYD	Magat 4	97	19-Mar-21	19-Mar-21	0.53	Forced Outage	Due to APM of Magat 3	01 October, 1983	12
LUZON	HYD	Magat 4	97	25-Mar-21	26-Mar-21	0.95	Forced Outage	Emergency shutdown due to oil leak at servo motor	01 October, 1983	22
LUZON	HYD	Magat 4	97	04-Apr-21	04-Apr-21	0.03	Forced Outage	Affected by Magat 3 testing.	01 October, 1983	1
LUZON	HYD	Magat 4	97	11-May-21	11-May-21	0.68	Maintenance Outage	Internal blackstart test of Magat U3	01 October, 1983	16
LUZON	HYD	Pantabangan 1	60	11-May-21	15-May-21	4.29	Maintenance Outage	APM	01 December, 2009	103
LUZON	HYD	Pantabangan 2	60	22-May-21	22-May-21	0.35	Maintenance Outage	APM	01 December, 2010	8
LUZON	HYD	San Roque 1	145	25-Jan-21	06-Feb-21	12.00	Planned Outage	Maintenance Outage until 05 February 2021.(GOP)	01 May, 2003	288
LUZON	HYD	San Roque 1	145	30-May-21	14-Jun-21	15.00	Planned Outage	Scheduled shutdown (GOP) until 13 June 2021.	01 May, 2003	360
LUZON	HYD	San Roque 2	145	15-Feb-21	27-Feb-21	12.00	Planned Outage	Maintenance Outage until 26 February 2021	01 May, 2003	288
LUZON	HYD	San Roque 2	145	30-May-21	14-Jun-21	15.00	Planned Outage	Scheduled shutdown (GOP) until 13 June 2021.	01 May, 2003	360
LUZON	HYD	San Roque 3	145	08-Mar-21	20-Mar-21	12.00	Planned Outage	Maintenance Outage until March 19 2021	01 May, 2003	288
LUZON	HYD	San Roque 3	145	30-May-21	14-Jun-21	15.00	Planned Outage	Scheduled shutdown (GOP) until 13 June 2021.	01 May, 2003	360
LUZON	HYD	San Roque 3	145	03-Feb-21	03-Feb-21	0.21	Forced Outage	Tripped at 116MW	01 May, 2003	5
LUZON	HYD	Kalayaan 1	180	27-May-21	29-May-21	2.37	Forced Outage	Tail water gate trouble	01 August, 1982	57
LUZON	HYD	Kalayaan 2	180	11-Feb-21	20-Feb-21	9.82	Planned Outage	Maintenance Outage until 14 February 2021	01 August, 1982	235
LUZON	HYD	Kalayaan 2	180	03-Jan-21	03-Jan-21	0.05	Forced Outage	Emergency shutdown as Pump. Leakage at Heat Exchanger(Cooling System)	01 August, 1982	1
LUZON	HYD	Kalayaan 3	180	24-Nov-20	06-Dec-20	12.00	Planned Outage	Maintenance Outage	01 May, 2004	240
LUZON	HYD	Kalayaan 3	180	03-Feb-21	09-Feb-21	6.82	Planned Outage	Maintenance Outage until 10 February 2021	01 May, 2004	163
LUZON	HYD	Kalayaan 3	180	07-Dec-20	07-Dec-20	0.37	Forced Outage	Spherical valve trouble	01 May, 2004	9
LUZON	HYD	Kalayaan 3	180	04-Jan-21	04-Jan-21	0.08	Forced Outage	Loss of power in Prog. Logic Controller	01 May, 2004	1
LUZON	HYD	Kalayaan 3	180	26-Feb-21	26-Feb-21	0.02	Forced Outage	Tripped from 170MW load due to cooling water system failure	01 May, 2004	1
LUZON	HYD	Kalayaan 3	180	26-May-21	26-May-21	0.08	Forced Outage	Tripped due to the activation of T04 Stator Earth Gen. 64G	01 May, 2004	2
LUZON	HYD	Kalayaan 3	180	18-Jun-21	22-Jun-21	4.80	Maintenance Outage	Maintenance Outage	01 May, 2004	115
LUZON	HYD	Kalayaan 4	180	27-Nov-20	23-Mar-21	115.67	Forced Outage	Excessive Oil Leak at Pothead conductors.	01 May, 2004	2776
LUZON	HYD	Kalayaan 4	180	29-Mar-21	30-Mar-21	1.69	Forced Outage	Extended Maintenance Outage	01 May, 2004	40
LUZON	HYD	Kalayaan 4	180	05-May-21	05-May-21	0.01	Forced Outage	Tripped due to cooling water system trouble.	01 May, 2004	1
LUZON	NATG	Avion 1	50.3	18-Jun-21	20-Jun-21	2.89	Planned Outage	Semi-Annual inspection.	01 August, 2016	69
LUZON	NATG	Avion 1	50.3	02-Dec-20	02-Dec-20	0.73	Forced Outage	Transformer differential protection actuated and scheduled as RR.	01 August, 2016	18
LUZON	NATG	Avion 1	50.3	16-Dec-20	17-Dec-20	0.26	Forced Outage	Tripped due to mis-operation of transformer fire protection.	01 August, 2016	6
LUZON	NATG	Avion 1	50.3	14-Mar-21	14-Mar-21	0.51	Forced Outage	Observed loss of real-time monitoring for Avion 1 and 2	01 August, 2016	12
LUZON	NATG	Avion 1	50.3	16-Apr-21	17-Apr-21	0.65	Forced Outage	Tripped at 40MW load. As RR non firm. Solenoid Valve trouble at the turbine side.	01 August, 2016	15
LUZON	NATG	Avion 1	50.3	02-Jun-21	03-Jun-21	0.29	Forced Outage	Tubine fan enclosure problem	01 August, 2016	7
LUZON	NATG	Avion 1	50.3	07-Jun-21	07-Jun-21	0.13	Forced Outage	Tripped due to liquid manifold drain valve	01 August, 2016	3

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	Total
LUZON	NATG	Avion 1	50.3	11-Apr-21	11-Apr-21	0.49	Maintenance Outage	Planned maintenance as per GOP	01 August, 2016	11
LUZON	NATG	Avion 2	50.3	21-Mar-21	21-Mar-21	0.49	Planned Outage	Planned outage.	01 August, 2016	11
LUZON	NATG	Avion 2	50.3	20-Jun-21	20-Jun-21	0.89	Planned Outage	Semi-annual inspection of GT.	01 August, 2016	21
LUZON	NATG	Avion 2	50.3	16-Dec-20	17-Dec-20	0.18	Forced Outage	Tripped due to mis-operation of transformer fire protection.	01 August, 2016	4
LUZON	NATG	Ilijan A1	190	27-Mar-21	28-Mar-21	1.71	Planned Outage	Maintenance Outage until 29 March 2021	01 June, 2002	41
LUZON	NATG	Ilijan A1	190	11-May-21	11-May-21	0.10	Forced Outage	Blade path variation temperature problem(turbine side)..	01 June, 2002	3
LUZON	NATG	Ilijan A1	190	02-Jun-21	03-Jun-21	0.36	Forced Outage	Cooling strainers high differential pressure due to bad sea water condition	01 June, 2002	8
LUZON	NATG	Ilijan A1	190	26-Nov-20	26-Nov-20	0.80	Maintenance Outage	For battery replacement of the unit	01 June, 2002	19
LUZON	NATG	Ilijan A2	190	28-Mar-21	30-Mar-21	1.67	Planned Outage	Planned Outage	01 June, 2002	40
LUZON	NATG	Ilijan B1	190	21-Feb-21	09-Mar-21	16.06	Planned Outage	Maintenance Outage until 09 March 2021	01 June, 2002	385
LUZON	NATG	Ilijan B1	190	02-Jun-21	03-Jun-21	0.44	Forced Outage	Cooling strainers high differential pressure due to bad sea water condition	01 June, 2002	10
LUZON	NATG	Ilijan B2	190	24-Feb-21	11-Mar-21	15.59	Planned Outage	Planned Outage(GOP).	01 June, 2002	374
LUZON	NATG	Ilijan B3	220	24-Feb-21	09-Mar-21	13.26	Planned Outage	Planned Outage (GOP)	01 June, 2002	318
LUZON	NATG	San Gabriel	420	05-Sep-20	15-Feb-21	162.98	Forced Outage	Tripped at 211MW load. System Frequency is 59.401hz.	01 July, 2016	1960
LUZON	NATG	San Gabriel	420	15-Feb-21	16-Feb-21	0.92	Forced Outage	Boiler Feed Water Pump Trouble	01 July, 2016	23
LUZON	NATG	San Gabriel	420	16-Feb-21	17-Feb-21	0.47	Forced Outage	Boiler tripped.	01 July, 2016	11
LUZON	NATG	San Gabriel	420	15-Apr-21	15-Apr-21	0.77	Forced Outage	Actuation of circulating water system protection.	01 July, 2016	19
LUZON	NATG	San Gabriel	420	16-Apr-21	16-Apr-21	0.20	Forced Outage	Tripped due to actuation of condenser protection.	01 July, 2016	5
LUZON	NATG	San Gabriel	420	17-Apr-21	17-Apr-21	0.06	Forced Outage	To facilitate its gas valve line up	01 July, 2016	2
LUZON	NATG	San Gabriel	420	09-Apr-21	12-Apr-21	3.25	Maintenance Outage	Malampaya Gas Restriction.	01 July, 2016	79
LUZON	NATG	Sta. Rita 1	257.3	15-Jan-21	19-Jan-21	3.21	Planned Outage	Maintanance Outage until January 18 2021	01 June, 2000	77
LUZON	NATG	Sta. Rita 1	257.3	19-Jan-21	21-Jan-21	1.55	Forced Outage	Emergency shutdown due to exocessive steam leak.	01 June, 2000	37
LUZON	NATG	Sta. Rita 1	257.3	17-Mar-21	24-Mar-21	7.02	Forced Outage	Emergency shutdown due to gas turbine cooling air leak	01 June, 2000	169
LUZON	NATG	Sta. Rita 1	257.3	16-Jun-21	16-Jun-21	0.11	Forced Outage	Tripped from 257MW load due to activation of Batangas SIPS.	01 June, 2000	3
LUZON	NATG	Sta. Rita 1	257.3	23-Jun-21	23-Jun-21	0.20	Forced Outage	Gas Turbine protection tripped	01 June, 2000	5
LUZON	NATG	Sta. Rita 1	257.3	24-Jun-21			Forced Outage	GT protection actuated.Tripped at 122MW load. System Frequency is 59.63hz	01 June, 2000	38
LUZON	NATG	Sta. Rita 2	255.7	07-Mar-21	09-Mar-21	2.15	Forced Outage	Boiler trouble	01 June, 2000	51
LUZON	NATG	Sta. Rita 2	255.7	20-Apr-21	21-Apr-21	0.58	Forced Outage	Emergency shutdown to rectify NBN Valves for Fuel oil	01 June, 2000	14
LUZON	NATG	Sta. Rita 2	255.7	31-May-21	31-May-21	0.22	Forced Outage	Tripped due to actuation of GT Protection	01 June, 2000	5
LUZON	NATG	Sta. Rita 2	255.7	09-Jan-21	11-Jan-21	1.99	Maintenance Outage	GT offline washing.	01 June, 2000	47
LUZON	NATG	Sta. Rita 3	265.5	03-Jan-21	03-Jan-21	0.78	Forced Outage	Vent valve trouble.	01 October, 2001	18
LUZON	NATG	Sta. Rita 3	265.5	11-Jun-21	11-Jun-21	0.31	Forced Outage	GT protection actuation.	01 October, 2001	7
LUZON	NATG	Sta. Rita 3	265.5	12-Dec-20	14-Dec-20	2.42	Maintenance Outage	Maintenance Outage until 14 December 2020	01 October, 2001	59
LUZON	NATG	Sta. Rita 3	265.5	19-Jan-21	06-Mar-21	46.63	Maintenance Outage	Maintenance Outage	01 October, 2001	1119
LUZON	NATG	Sta. Rita 3	265.5	07-Mar-21	08-Mar-21	1.45	Maintenance Outage	Commissioning activities from scheduled shutdown.	01 October, 2001	34
LUZON	NATG	Sta. Rita 3	265.5	08-Mar-21	08-Mar-21	0.12	Maintenance Outage	Commissioning on Fuel-oil after major maintenance.	01 October, 2001	3
LUZON	NATG	Sta. Rita 4	264	15-Jan-21	15-Jan-21	0.18	Forced Outage	Tripped due to activation of GT Protection.	01 October, 2001	5
LUZON	NATG	Sta. Rita 4	264	02-Jan-21	03-Jan-21	1.81	Maintenance Outage	Maintenance Outage.	01 October, 2001	44
LUZON	NATG	Sta. Rita 4	264	26-Mar-21	08-Apr-21	13.86	Maintenance Outage	Unplanned maintenance outage to facilitate rectification of HRSG expansion bellow	01 October, 2001	333
LUZON	NATG	Sta. Rita 4	264	11-Jun-21	14-Jun-21	2.37	Maintenance Outage	Maintenance outage until 14 June 2021.	01 October, 2001	57
LUZON	NATG	San Lorenzo 1	264.8	04-Jan-21	05-Jan-21	0.35	Forced Outage	Gas flowmeter replacemnet	01 September, 2002	9
LUZON	NATG	San Lorenzo 1	264.8	30-Mar-21	30-Mar-21	0.20	Forced Outage	Tripped during change-over from fuel oil to natural gas.	01 September, 2002	5
LUZON	NATG	San Lorenzo 1	264.8	01-May-21	01-May-21	0.10	Forced Outage	High condenser vacuum pressure	01 September, 2002	2
LUZON	NATG	San Lorenzo 1	264.8	21-Jun-21	21-Jun-21	0.13	Forced Outage	Extended Maintenance Outage	01 September, 2002	3
LUZON	NATG	San Lorenzo 1	264.8	19-Dec-20	24-Dec-20	5.72	Maintenance Outage	Maintenance outage.	01 September, 2002	138
LUZON	NATG	San Lorenzo 1	264.8	10-Mar-21	20-Mar-21	10.19	Maintenance Outage	Maintenance Outage until 16 March 2021.	01 September, 2002	245
LUZON	NATG	San Lorenzo 1	264.8	21-May-21	24-May-21	2.64	Maintenance Outage	Maintenance Outage until 24 May 2021.	01 September, 2002	63
LUZON	NATG	San Lorenzo 1	264.8	19-Jun-21	21-Jun-21	2.23	Maintenance Outage	Maintenance Outage	01 September, 2002	54
LUZON	NATG	San Lorenzo 2	261.8	22-May-21	22-May-21	0.07	Forced Outage	Tripped due to activation of System Protection.	01 September, 2002	2
LUZON	NATG	San Lorenzo 2	261.8	26-Dec-20	31-Dec-20	5.11	Maintenance Outage	Maintenance Outage.	01 September, 2002	123
LUZON	NATG	San Lorenzo 2	261.8	30-Mar-21	31-Mar-21	1.63	Maintenance Outage	none	01 September, 2002	40
LUZON	NATG	San Lorenzo 2	261.8	28-May-21	31-May-21	2.34	Maintenance Outage	Maintenance Outage	01 September, 2002	56
LUZON	OIL	Limay 1	60	08-Mar-21	08-Mar-21	0.06	Forced Outage	Tripped due to flame-off while on performance testCapability Test).	01 May, 1993	2
LUZON	OIL	Limay 1	60	11-Mar-21	11-Mar-21	0.05	Forced Outage	Tripped due to flame-off trouble	01 May, 1993	1
LUZON	OIL	Limay 1	60	08-May-21	09-May-21	0.85	Forced Outage	Blow off valve air leak trouble.	01 May, 1993	20
LUZON	OIL	Limay 1	60	30-May-21	30-May-21	0.13	Forced Outage	Malfunction of module card of blow off valve test device or rotor boring operation	01 May, 1993	4
LUZON	OIL	Limay 1	60	05-Jun-21	05-Jun-21	0.48	Forced Outage	Tripped due to acceleration by start limit activated and pressure after electro hydraulic converter oil greater than max.	01 May, 1993	12
LUZON	OIL	Limay 1	60	05-Jun-21	06-Jun-21	0.73	Forced Outage	Failed start-up.	01 May, 1993	18
LUZON	OIL	Limay 1	60	25-Jun-21	25-Jun-21	0.01	Forced Outage	Failed to start as Regulating Plant.	01 May, 1993	1
LUZON	OIL	Limay 2	60	29-Jan-21	02-Feb-21	4.59	Planned Outage	Maintenance Outage until 04 February 2021.(GOP)	01 May, 1993	110
LUZON	OIL	Limay 3	60	25-Jan-21	26-Jan-21	0.40	Forced Outage	Diesel leak at combustor	01 May, 1993	10
LUZON	OIL	Limay 3	60	23-Feb-21	27-Feb-21	4.44	Forced Outage	Failed start-up. Blow-off valve air leak.	01 May, 1993	107
LUZON	OIL	Limay 4	90	11-Mar-21	11-Mar-21	0.04	Forced Outage	ST Protection activation due to turbo turn hardware failure	01 May, 1993	1
LUZON	OIL	Limay 4	90	11-Mar-21	11-Mar-21	0.04	Forced Outage	ST Protection activation due to turbo turn hardware failure	01 May, 1993	1
LUZON	OIL	Limay 4	90	22-May-21	23-May-21	1.57	Maintenance Outage	Electrical testing and inspection until 23 May 2021	01 May, 1993	37
LUZON	OIL	Limay 5	60	06-Feb-21	10-Feb-21	4.50	Planned Outage	Maintenance Outage until 16 February 2021	01 December, 1994	108
LUZON	OIL	Limay 5	60	12-Feb-21	12-Feb-21	0.14	Forced Outage	Scheduled NGCP switchyard activity at BCCPP Bay 88	01 December, 1994	4
LUZON	OIL	Limay 5	60	29-Mar-21	30-Mar-21	0.80	Forced Outage	Main fuel oil pump problem.	01 December, 1994	19
LUZON	OIL	Limay 5	60	22-May-21	22-May-21	0.14	Forced Outage	Declared unavailable due to 125VDC power supply failure	01 December, 1994	3
LUZON	OIL	Limay 5	60	28-Nov-20	02-Dec-20	4.60	Maintenance Outage	Maintenance Outage.	01 December, 1994	110
LUZON	OIL	Limay 6	60	03-Feb-21	03-Feb-21	0.40	Forced Outage	Main Fuel Pump Oil Leak	01 December, 1994	10
LUZON	OIL	Limay 7	60	10-Mar-21	10-Mar-21	0.05	Forced Outage	Flame-off trouble	01 December, 1994	1
LUZON	OIL	Limay 7	60	25-May-21	26-May-21	0.84	Forced Outage	Declared unavailable due to fuel valve malfuction	01 December, 1994	20
LUZON	OIL	Limay 8	90	04-Jan-21	27-Feb-21	54.61	Planned Outage	Maintenance Outage until 03 February 2021	01 December, 1994	1310
LUZON	OIL	Malaya 1	300	03-May-19			Forced Outage	Declared unavailable due to motorization of unit generator caused by the non-opening of phase B of PCB 8-05CB08MAL	01 August, 1975	5088
LUZON	WIND	Burgos 1	150	11-May-21	11-May-21	0.45	Maintenance Outage	APM	01 November, 2014	11
LUZON	WIND	Burgos 1	150	12-May-21	12-May-21	0.45	Maintenance Outage	APM	01 November, 2014	11
LUZON	WIND	Burgos 1	150	13-May-21	13-May-21	0.46	Maintenance Outage	APM	01 November, 2014	11
VISAYAS	COAL	CEDC 1	82	24-Feb-21	15-Jun-21	111.96	Planned Outage	UNIT SHUTDOWN TO FACILITATE ANUAL PMS UNTIL 17 MARCH 2021	01 April, 2010	2687
VISAYAS	COAL	CEDC 1	82	16-Jun-21	19-Jun-21	3.18	Forced Outage	EMERGENCY CUT-OUT FROM THE SYSTEM FOR POSSIBLE BOILER TUBE LEAK	01 April, 2010	77
VISAYAS	COAL	CEDC 2	82	15-Apr-21	05-May-21	20.65	Forced Outage	PMS	01 June, 2010	496
VISAYAS	COAL	CEDC 3	82	21-Feb-21	09-Apr-21	47.46	Forced Outage	TO CONDUCT REPAIR OF COAL FEEDER	01 January, 2011	1139
VISAYAS	COAL	CEDC 3	82	10-Apr-21	13-Apr-21	3.34	Forced Outage	UNIT TRIPPED. POSSIBLE TUBE LEAK	01 January, 2011	80
VISAYAS	COAL	Kepco Salcon 1	103	06-May-21	03-Jun-21	26.17	Planned Outage	APMS	01 November, 2010	628
VISAYAS	COAL	Kepco Salcon 1	103	11-Mar-21	14-Mar-21	3.56	Forced Outage	Boiler Tube Leak	01 November, 2010	85
VISAYAS	COAL	Kepco Salcon 1	103	15-Mar-21	16-Mar-21	1.19	Forced Outage	EMERGENCY CUT-OUT FROM THE SYSTEM DUE TO POSSIBLE TUBE LEAK PROBLEM	01 November, 2010	29
VISAYAS	COAL	Kepco Salcon 2	103	07-Jun-21			Planned Outage	APMS	01 March, 2011	454
VISAYAS	COAL	Kepco Salcon 2	103	14-Apr-21	14-May-21	30.08	Forced Outage	SUSPECTED BOILER TUBE LEAK	01 March, 2011	722
VISAYAS	COAL	Kepco Salcon 2	103	14-May-21	15-May-21	1.00	Forced Outage	AFFECTED BY TRIPPING OF 7XF02KSP TRANSFORMER	01 March, 2011	24
VISAYAS	COAL	THVI 1	169	24-Feb-21	19-Mar-21	22.63	Planned Outage	UNIT TRIPPED DURING RAMPING DOWN TO ZERO LOAD (RTD is 0) WITH INDICATION. TURBINE HP EXHAUST TEMPERATURE HIGH HIGH. SCHEDULE FOR	01 April, 2019	543
VISAYAS	COAL	THVI 1	169	28-Nov-20	12-Dec-20	14.04	Forced Outage	AUTO TRIPPED WITH INDICATION FURNACE PRESSURE HIGH HIGH	01 April, 2019	337
VISAYAS	COAL	THVI 1	169	12-Dec-20	18-Dec-20	5.23	Forced Outage	GENERATOR WINDING TEMP HIGH	01 April, 2019	126
VISAYAS	COAL	THVI 1	169	26-Apr-21	02-May-21	5.65	Forced Outage	TURBINE TRIPPED INDICATION	01 April, 2019	135
VISAYAS	COAL	THVI 2	169	24-Jan-21	24-Feb-21	30.22	Planned Outage	ANNUAL PMS	01 September, 2019	725
VISAYAS	COAL	THVI 2	169	07-Jan-21	07-Jan-21	0.11	Forced Outage	GENERATOR HIGH WINDING TEMPERATURE	01 September, 2019	3
VISAYAS	COAL	THVI 2	169	07-Mar-21	08-Mar-21	1.01	Forced Outage	Unit Tripped with IDF problem	01 September, 2019	24
VISAYAS	COAL	THVI 2	169	16-Jun-21			Forced Outage	EMERGENCY CUT-OUT FROM THE SYSTEM. POSSIBLE TUBE LEAK AT SEPARATOR SIDE	01 September, 2019	219
VISAYAS	COAL	TPC Sangi 1	60	17-Dec-19	22-Jan-21	402.47	Forced Outage	Generator differential trip	01 October, 2015	1385
VISAYAS	COAL	TPC Sangi 2	85	22-Jan-21	27-Jan-21	4.85	Forced Outage	TPC SANGI UNIT 1 (DG4) EMERGENCY CUT-OUT DUE TO HIGH STATOR WINDING TEMPERATURE	01 October, 2015	116
VISAYAS	COAL	TPC Sangi 2	85	29-Jan-21	19-Mar-21	48.93	Forced Outage	EMERGENCY CUT-OUT DUE TO OIL LEAK at BEARING 4	01 October, 2015	1174
VISAYAS	COAL	TPC Sangi 2	85	23-Mar-21	23-Mar-21	0.78	Forced Outage	TG4 AUTO-TRIPPED DUE TO TRUSS BEARING HIGH VIBRATION	01 October, 2015	19
VISAYAS	COAL	TPC Sangi 2	85	25-Mar-21	25-Mar-21	0.03	Forced Outage	TG 4 - AUTO TRIPPED DUE TO DRUM LEVEL LOW	01 October, 2015	1
VISAYAS	COAL	TPC Sangi 2	85	21-May-21	21-May-21	0.22	Forced Outage	TPC SANGI TG5 TRIPPED DUE TO HIGH TEMPERATURE OF BEARING NO. 2	01 October, 2015	5
VISAYAS	COAL	TPC Sangi 2	85	23-May-21	11-Jun-21	19.67	Forced Outage	TG5 OFFLINE DUE HIGH VIBRATION BEARING 5	01 October, 2015	472
VISAYAS	COAL	TPC Sangi 2	85	27-Jan-21	29-Jan-21	2.22	Maintenance Outage	ON GOING TESTING	01 October, 2015	54
VISAYAS	COAL	PALM 1	135	29-Nov-20	29-Nov-20	0.14	Forced Outage	Steam failure	01 August, 2016	3
VISAYAS	COAL	PALM 1	135	23-Jan-21	23-Jan-21	0.12	Forced Outage	Due to electrical trouble	01 August, 2016	3
VISAYAS	COAL	PALM 1	135	05-Mar-21	05-Mar-21	0.05	Forced Outage	Due to internal trouble	01 August, 2016	1
VISAYAS	COAL	PALM 1	135	12-Mar-21	12-Mar-21	0.05	Forced Outage	High Vibration at 2nd Fan	01 August, 2016	1
VISAYAS	COAL	PALM 1	135	07-Apr-21	07-Apr-21	0.08	Forced Outage	Due to internal trouble (Master fuel trip by primary air fan)	01 August, 2016	2
VISAYAS	COAL	PALM 1	135	24-Apr-21	24-Apr-21	0.10	Forced Outage	Internal Trouble	01 August, 2016	2
VISAYAS	COAL	PEDC 1	83.7	19-Dec-20	20-Dec-20	0.71	Forced Outage	Due to internal trouble	01 November, 2010	17
VISAYAS	COAL	PEDC 1	83.7	23-Dec-20	23-Dec-20	0.57	Forced Outage	Repair feed water line leak	01 November, 2010	13
VISAYAS	COAL	PEDC 1	83.7	07-Mar-21	07-Mar-21	0.60	Maintenance Outage	Maintenance on Boiler Pump.	01 November, 2010	15
VISAYAS	COAL	PEDC 2	83.7	05-Jan-21	06-Jan-21	0.94	Forced Outage	Due to possible centering(Sudden increase of Furnace Upper Temperature and Abrupt decrease of Furnace Lower Temperature and Bed Pressure.)	01 April, 2011	23
VISAYAS	COAL	PEDC 2	83.7	06-Jan-21	08-Jan-21	1.89	Forced Outage	Due to low furnace temperature	01 April, 2011	45
VISAYAS	COAL	PEDC 2	83.7	14-Jan-21	16-Jan-21	2.06	Forced Outage	Due to possible tube leak	01 April, 2011	50
VISAYAS	COAL	PEDC 2	83.7	19-Feb-21	20-Feb-21	1.40	Forced Outage	due to furnace trouble	01 April, 2011	34
VISAYAS	COAL	PEDC 2	83.7	18-Mar-21	18-Mar-21	0.25	Forced Outage	Due to Steam leak at steam drum	01 April, 2011	6
VISAYAS	COAL	PEDC 2	83.7	28-Jan-21	19-Feb-21	22.26	Maintenance Outage	Annual PMS	01 April, 2011	535
VISAYAS	COAL	PEDC 3	150	25-Dec-20	24-Jan-21	30.50	Planned Outage	PMS	01 December, 2016	732
VISAYAS	COAL	PEDC 3	150	26-May-21	27-May-21	0.28	Forced Outage	Auto tripped(150.0MW) due to Fluidized Air Blower problem.	01 December, 2016	7
VISAYAS	COAL	PEDC 3	150	09-Jun-21	10-Jun-21	0.22	Forced Outage	Blow off steam valve	01 December, 2016	5
VISAYAS	COAL	PEDC 3	150	10-Jun-21	15-Jun-21	4.96	Forced Outage	Under investigation	01 December, 2016	119
VISAYAS	COAL	PEDC 3	150	02-May-21	03-May-21	1.04	Maintenance Outage	For Maintenance.	01 December, 2016	25
VISAYAS	GEO	Malitbog 1	72	20-Feb-21	26-Feb-21	6.09	Maintenance Outage	EDC-Leyte A MBPP Unit 1 plant shutdown for PMS	01 July, 1997	146
VISAYAS	GEO	Malitbog 2	72	30-Nov-20	30-Nov-20	0.03	Forced Outage	Under assessment	01 July, 1997	1
VISAYAS	GEO	Malitbog 2	72	31-Dec-20	03-Jan-21	2.97	Forced Outage	Under assessment.	01 July, 1997	71
VISAYAS	GEO	Malitbog 2	72	03-Feb-21	04-Feb-21	0.90	Forced Outage	Under assessment	01 July, 1997	21
VISAYAS	GEO	Malitbog 2	72	28-Mar-21	28-Mar-21	0.07	Forced Outage	Under assesment	01 July, 1997	1
VISAYAS	GEO	Malitbog 2	72	06-Apr-21	06-Apr-21	0.21	Forced Outage	Condenser high level.	01 July, 1997	5
VISAYAS	GEO	Malitbog 2	72	06-Apr-21	06-Apr-21	0.26	Forced Outage	Condenser high level.	01 July, 1997	6
VISAYAS	GEO	Malitbog 2	72	06-Apr-21	06-Apr-21	0.05	Forced Outage	Under assessment.	01 July, 1997	1
VISAYAS	GEO	Malitbog 3	72	20-Feb-21	26-Feb-21	6.43	Maintenance Outage	EDC-Leyte A MBPP Unit 3 plant shutdown for PMS	01 July, 1997	154
VISAYAS	SOLR	Cadiz	108.1	17-Mar-21	18-Mar-21	0.14	Forced Outage	Isolated from the grid due to the emergency shutdown of 138kV Bacolod-Cadiz TL	01 March, 2016	3
VISAYAS	WIND	SLWind	54	30-Jan-21	30-Jan-21	0.02	Forced Outage	Due to line tripping	01 December, 2014	1
VISAYAS	WIND	SLWind	54	06-Feb-21	06-Feb-21	0.02	Forced Outage	Affected by line tripping	01 December, 2014	1
VISAYAS	WIND	SLWind	54	30-Nov-20	30-Nov-20	0.50	Maintenance Outage	Due to NGCP PMS	01 December, 2014	12