Luzon Power Outlook: Reviewing the Adequacy of Power Supply for April to June 2023

INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES

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Reviewing the Adequacy of Power Supply for April to June 2023

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1. Introduction

Last year, the Institute for Climate and Sustainable Cities (ICSC) released a report entitled **"Luzon Power Outlook: Determining the Adequacy of Power Supply for April-June 2022"**, warning of a possible shortfall in the country's power supply in the second quarter of the year. This 2023, the Philippine grid still faces the same threat.

The sufficiency of power supply during the summer season in the Luzon grid has been a recurring issue for several years. Despite the lockdowns and much lower demand during the pandemic, threats of grid alert levels and blackouts due to forced outages and deration of power plants had significantly reduced the power generating capacity of the grid.

While the Department of Energy (DOE) has stated that there is no immediate threat of summer blackouts as long as power plants operate as planned, it cannot be assured that unplanned forced outages from these power producers will not occur this summer, nor that these outages will be resolved soon. Thus, it is important to remain cautious of the thinning power supply in the upcoming summer months.

During the Philippine Electric Power Industry Forum (PEPIF) on March 20, 2023, Undersecretary Rowena Guevara reassured the public that there is still no threat of blackouts this summer. She presented the DOE's analysis on the Luzon Grid Power Demand Outlook, as of Week 9 of 2023. The analysis indicated that a total of 15 weeks in 2023 are forecasted to be under yellow alert, and none under red alert status. The most crucial period will be between Weeks 17 to 24 (beginning April 24, 2023), when the forecasted operating margins might fall to yellow alert and further be depleted as conditions in the grid vary.

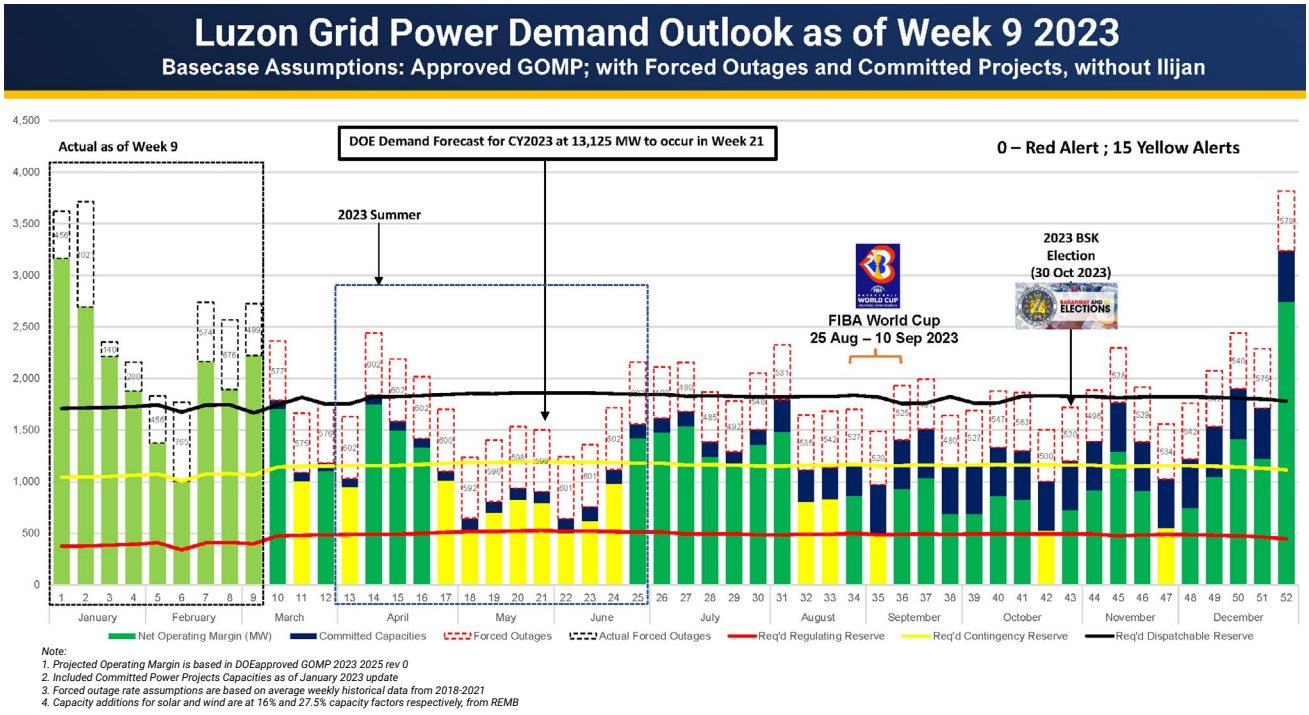


Figure 1: Latest Power Outlook 2023 for Luzon grid

Source: PEPIF: Partnering to Achieve a Secure and Reliable Supply of Electricity for the Country, (DOE 2023)

The assumptions of DOE's power outlook are as follows:

1. Peak demand requirements are at 13,125 megawatts (MW), set during the last week of May 2023;
2. The schedule of outages was based on the approved Grid Operating and Maintenance Program (GOMP), wherein no maintenance outages during Q2 2023 are planned;
3. Forced power plant outages will amount to about 600 MW during Q2 2023;
4. Additional capacities from committed power projects are scheduled to be completed within the year and will contribute to the power supply;
5. No Ilijan combined-cycle natural gas power plant operation;
6. No high-voltage direct current (HVDC) power import from Visayas;
7. Deration of hydropower plants for Q2 2023 due to seasonality.

The undersecretary noted that the HVDC line could provide 250 MW from Visayas to Luzon and help provide the necessary capacity. Moreover, a liquefied natural gas (LNG) terminal is expected to be operational by June 2023 to provide gas supply to the Ilijan power plant in Batangas City, which could add 1,200 MW capacity by June. San Miguel Corporation (SMC) Mariveles Units 1 and 2 will also provide additional capacities to the Luzon grid as early as August and September 2023, respectively. These additional capacities will be able to contribute to the power capacity of the Luzon grid.

This report sets out to review the assumptions of the DOE's power demand and supply outlook to ensure adequate preparation for this summer's high demand.

2. Analysis

A more detailed version of the Luzon power demand outlook from Week 1 of 2023 is available on the National Grid Corporation of the Philippines (NGCP) website (NGCP, 2023). The Week 9 scenario was recreated by updating some of the parameters. From this data, we can assess the robustness of the analysis and determine if the grid alert levels are probable in the upcoming weeks. The adapted power outlook is presented in Table 1 and visualized in Figure 2.

Table 1: 2023 Q2 Power outlook for Luzon grid

Week	13	14	15	16	17	18	19	20	21	22	23	24	25	26
From date	03/27	04/03	04/10	04/17	04/24	05/01	05/08	05/15	05/22	05/29	06/05	06/12	06/19	06/26
To date	04/02	04/09	04/16	04/23	04/30	05/07	05/14	05/21	05/28	06/04	06/11	06/18	06/25	07/02
Thermal	311	311	311	311	311	311	311	311	311	311	311	311	311	311
Coal	7,627	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962	7,962
Diesel/ Gas turbine	723	729	729	729	729	729	729	729	729	729	729	729	729	729
Natural Gas	2,102	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615	2,615
Geothermal	410	473	473	473	473	473	473	473	473	473	473	473	473	473
Wind Farm	201	28	19	137	85	74	55	36	17	28	15	161	26	98
Solar	385	389	381	381	379	379	391	396	393	381	381	377	385	393
Biomass	107	107	107	107	107	107	107	107	107	107	107	107	107	107
Hydro	1,864	1,914	1,719	1,675	1,693	1,415	1,560	1,892	1,908	1,570	1,687	1,737	2,204	2,064
Total Available Generation (MW)	**13,730**	**14,528**	**14,316**	**14,390**	**14,354**	**14,065**	**14,203**	**14,521**	**14,515**	**14,176**	**14,280**	**14,472**	**14,812**	**14,752**
Forced outage (MW)	602	602	602	602	600	592	596	598	599	601	601	602	602	499
Committed capacities to be added (MW)*	88	88	88	88	88	93	93	93	93	93	93	93	93	93
Forecasted System Peak Demand (MW)	12,183	12,179	12,221	12,462	12,746	12,942	12,915	13,099	13,125	13,076	13,064	12,896	12,792	12,780
Operating Margin	**1,033**	**1,835**	**1,581**	**1,414**	**1,096**	**624**	**785**	**917**	**884**	**592**	**708**	**1,067**	**1,511**	**1,566**

Source: 2023 Luzon Grid Weekly Demand, Supply and Operating Margin Profile, NGCP

** Committed capacities whose status is awaiting Certificates of Compliance (COC) and Provisional Authorities to Operate (PAO) from the Energy Regulatory Commission (ERC) as of January 2023*

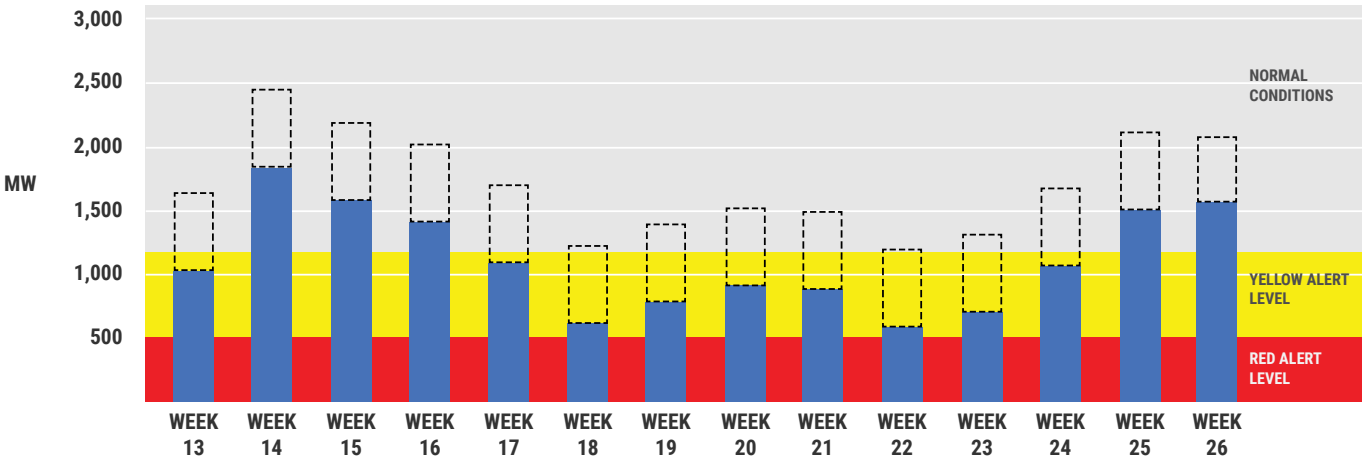


Figure 2: 2023 Q2 Power Outlook for Luzon grid (excluding committed capacities)

To assess the assumptions on the available generation per technology, we compare them to the actual installed or dependable capacity of each technology. The available weekly generation capacity should not exceed its installed or dependable capacity. Moreover, dispatchable technologies (such as coal, natural gas, geothermal, and biomass) can provide their full dependable capacity week after week, while variable generation technologies (such as solar, wind, and hydro) will be dependent on weekly weather patterns and subject to capacity factor adjustments. This is reflected in Table 1, where the available generation capacity of coal, diesel, thermal, biomass, and geothermal are constant across the weeks. In contrast, the weekly available generation capacity of solar, wind, and hydro plants vary.

Table 2: Installed and dependable capacity in comparison to maximum available generation in Luzon Q2 power outlook per technology

	Total Installed Capacity (MW)	Total Dependable Capacity (MW)	Maximum Available Generation in Q2 2023 Power Outlook (MW)
Thermal	650	305	311
Coal	8,759	8,192	7,962
Diesel/ Gas turbine	1,719	1,306	729
Combined Cycle/ Natgas	3,731	2,172	2,615 *(Exceeds dependable capacity)*
Geothermal	865	769	473
Wind Farm	337	337	201
Solar	959	767	396
Biomass	206	141	107
Hydro	2,542	2,416	2,204
TOTAL	**19,767**	**16,404**	**14,998**

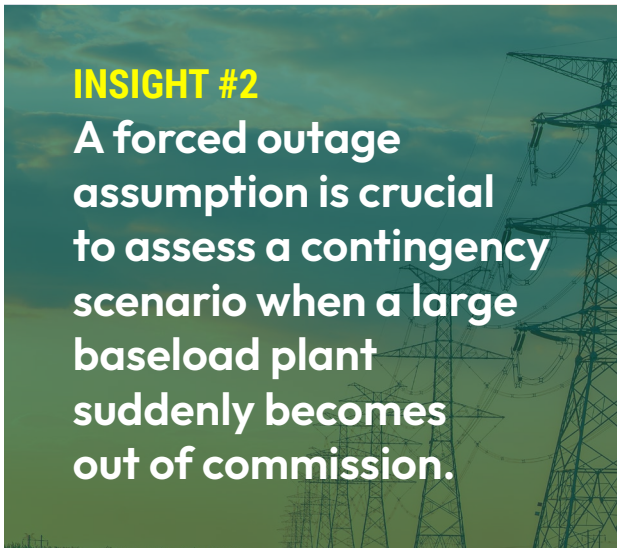
From DOE's latest list of existing power plants, the installed capacity of all existing plants in the Luzon grid is 19,767 MW—of which, 16,404 MW are dependable capacity (DOE, 2022). Moreover, it should be noted that the 1,200 MW Ilijan combined-cycle power plant was not considered to be dependable capacity, since it has not been operational due to lack of gas supply since June 2022.

From Table 1, the available generation capacity from natural gas reached 2,615 MW starting April 3, 2023, exceeding the total natural gas dependable capacity of 2,172 MW (excluding Ilijan power plant), as reflected in Table 2. This means that about 433 MW of natural gas power capacity is unaccounted for. However, Linseed Field Corporation is reportedly scheduled to commission its first integrated LNG import terminal in Barangay Ilijan in Batangas City in April 2023 (Flores, 2023). This would explain the unaccounted natural gas capacity, as the Ilijan combined-cycle power plant is expected to resume operation using its own gas supply.

From these numbers, the Ilijan power plant, through the Linseed LNG terminal, would provide at least 433 MW of power capacity by April 2023 to supplement power capacity. However, the power outlook indicates that its commissioning is not urgently needed by Week 13, but rather required by Weeks 17 to 24, when demand is projected at its highest this year. This is the critical period when Ilijan and all other plants must operate reliably. Moreover, this insight conflicts with the DOE's base assumption of the power outlook mentioning "without Ilijan power plant" operations.

Another important consideration reflected in the power outlook is the forced outages: While strict compliance with the GOMP is one of the assumptions of the power outlook, a potential contingency scenario when a large baseload plant suddenly becomes out of commission must not be discounted. The possible 600 MW of forced outage, which is roughly the same capacity as the biggest power plant in the grid, is a reasonable assumption in the power outlook. More so because historical operational data has consistently shown that forced outages can still occur despite the imposition of the GOMP from DOE.

An example was in the Summer of 2021, when four baseload power plants simultaneously became unavailable, leading to about 1,500 MW of lost power capacity followed by rotating blackouts (Lopez, 2021). This was, however, a rare occasion of simultaneous outages of several power plants.



If forced outages indeed occur during high demand, the system has to rely on more expensive power generators—specifically, diesel and bunker fuel thermal power plants. Therefore, once the system experiences forced outages of several baseload power plants, the price of electricity will significantly increase to ensure the continuity of electricity supply and to prevent any brownouts or blackouts.

Another assumption in the latest power demand outlook for the Luzon grid is the additional capacities brought about by committed power projects scheduled to be completed within the year. Based on the DOE's list of committed power projects as of January 31, 2023, several projects have a date of commercial operation within this year (DOE, 2023). Specifically, from March to May 2023, almost 500 MW of scheduled committed capacities can supplement the power supply in the grid if they are commissioned on time.

Table 3: Committed Capacities that are planned to be on commercial operation within the year

Committed Capacity (MW)								
Commercial Operation	Oil	Coal	Geothermal	Wind	Solar	Biomass	Hydro	Grand Total
Mar 2023		44.4		80.0	247.8		16.3	388.5
Apr 2023							9.5	9.5
May 2023					92.7	5.0		97.7
Jun 2023	11.1		29.0					40.1
Jul 2023							4.8	4.8
Aug 2023		150.0		30.0	44.0	2.4		226.4
Sep 2023		150.0			82.5			232.5
Dec 2023			17.0				0.8	17.8
Grand Total	**11.1**	**344.4**	**46.0**	**110.0**	**467.0**	**7.4**	**31.4**	**1017.2**

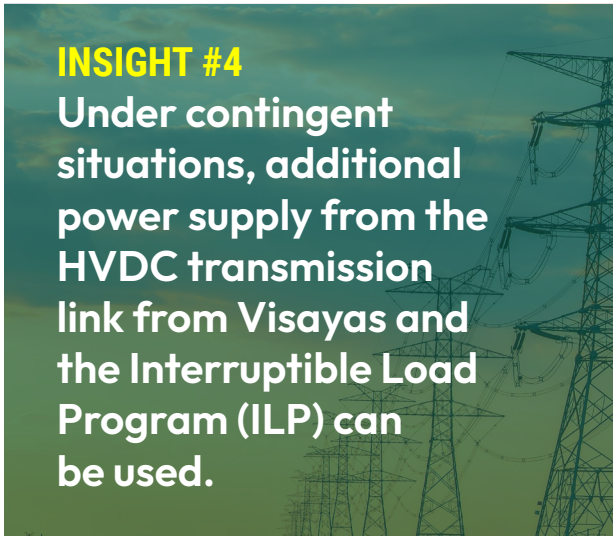
Of these committed power projects, two are already awaiting the Energy Regulatory Commission (ERC)'s issuance of its Certificate of Compliance (COC) and Provisional Authority to Operate (PAO), with a cumulative capacity of 92.60 MW that could potentially augment the power supply this Summer 2023.

Table 4: Committed Capacities that are awaiting ERC issuance

Project	Target Commercial Operation	MW Capacity	Status as of January 2023
Ilocos Norte Solar Power Project	March 2023	87.60	Awaiting for ERC issuance of COC/PAO; under testing and commissioning,
Isabela Rice husk-Fired Biomass Power Plant Project	May 2023	5.00	Awaiting for ERC issuance of COC/PAO

Additional assumptions not considered in the base case assumptions can also contribute to the power supply adequacy this Q2 2023—such as the HVDC transmission link and the Interruptible Load Program (ILP).

Under emergency situations, the HVDC transmission link can readily transmit excess capacity from Visayas, as it has already been doing in the past years of its operation. This provides another layer of flexibility that can supplement the power capacity needs in Summer 2023.



Moreover, the interruptible load program (ILP) by Distribution Utilities is an energy demand-side management program that can also help augment the power supply during emergency conditions. This is done by asking large-load customers to use their in-house back-up generator sets or reduce their operations, instead of drawing power from the grid. As of April 2023, MERALCO has confirmed that they have an ILP capacity of 616 MW—this capacity can be tapped to prevent instances of red alert or when supply is insufficient to meet the demand.

3. Conclusion

The Luzon Power Outlook reaffirms that the power outlook this Summer 2023 is very tight, and multiple yellow alert issuances are indeed possible within the year. The cooperation of various stakeholders, from the government, power plant operators, and even the consumers, to ensure the continuous supply of electricity is vital and extremely necessary.

The assumptions used in DOE's power outlook assumptions are realistic and capture a conservative scenario on the power supply demand outlook of Q2 2023—specifically, the consideration of forced outages is crucial in assessing potential contingency scenarios and providing valuable insights into their impacts on electricity rates.

However, it is important to establish whether the Ilijan plant will contribute to the power supply during the second quarter. The Ilijan power plant was not included in the power outlook base assumptions—but the numbers show that its entry by April 2023 is crucial. With this consideration, it is imperative to monitor if the Ilijan power plant and its corresponding LNG terminal could commit to this timetable and augment the power supply this Summer 2023.

Moreover, this analysis focused on the availability of power generating capacity in the Luzon grid, regardless if the use is for energy requirements or for the grid's ancillary purposes. It is best to ensure the sufficiency of ancillary services from the pool of available power generating capacity to ensure the grid will not experience power interruptions in case of forced outages. This includes ensuring there are sufficient firm ancillary capacities that are available to ensure reliability and availability of the grid.

The timely completion of the committed power projects to supplement the power capacity in the grid must be ensured not only by the proponents, but also by concerned government agencies and NGCP.

Moreover, the ILP and the HVDC transmission link between Luzon and Visayas may be tapped to augment power supply deficiency in Luzon.

Finally, ICSC supports Usec Guevara's statement that we, as consumers, must also do our part to contribute to demand-side management through energy efficiency and conservation. Initiatives such as implementing energy-saving practices in the workplace, shifting the use of energy-intensive activities to non-peak hours, and upgrading to more efficient technologies in homes or for commercial and industrial establishments will help in the thinning of power supply in the grid.

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