

Over-riding Constraints Report for 3rd Quarter of 2023

26 July to 25 September 2023

December 2023

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

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1. OVER-RIDING CONSTRAINTS MONITORING

This report details the results of the monitoring of over-riding constraints¹ imposed by the System Operator (SO) on generators for the 3rd quarter of 2023 (26 July to 25 September 2023).

1.1. Over-riding Constraints Impositions by Region

The third quarter of 2023 billing period documented a total of 145,281 over-riding constraint (OC) impositions², wherein commissioning tests³ and compliance with commercial and regulatory requirements contributed to approximately 89 percent of the total observations.

A significant portion of these impositions, totaling 112,687 (around 78 percent), were applied to Luzon plants. In contrast, Mindanao and Visayas plants were imposed with 19,571 impositions (or about 13 percent) and 13,023 impositions (or about 9 percent), respectively.

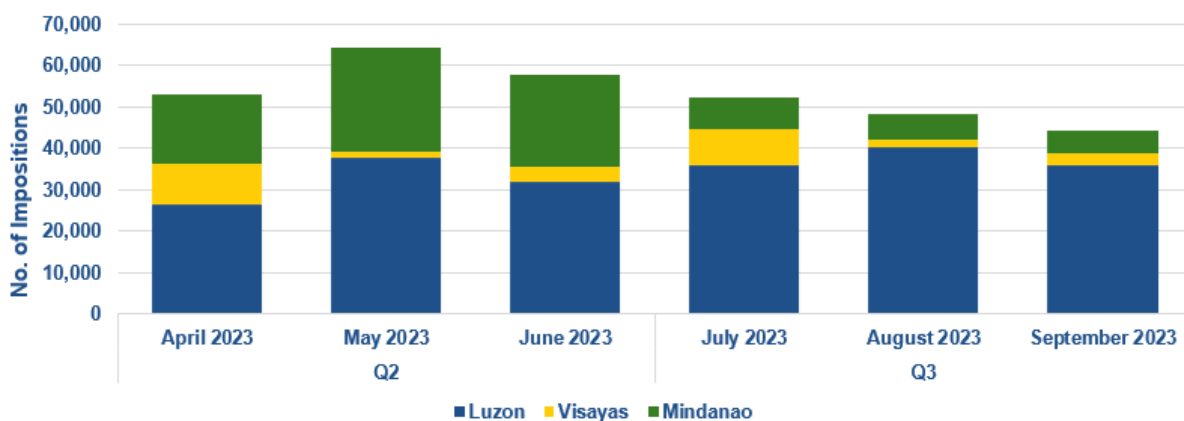


Figure 1. Monthly Comparison of Over-riding Constraints, by Region

¹ WESM Rules Clause 3.5.13.1 states that the SO may require the Market Operator (MO) to impose constraints on the power flow, energy generation of a specific facility in the grid to address system security threat, to mitigate the effects of a system emergency, or to address the need to dispatch generating units to comply with systems, regulatory and commercial tests requirements.

² The monitoring of the OC on generators is done on a per generator trading node per trading interval. A constraint imposed on a generator trading node on a particular trading interval is considered as one **OC imposition**. The monitoring of the OC is based on the data and information provided by MO (i.e., real time market results and MMS-input files on security limits) and SO (i.e., SO Data for Market Monitoring).

³ Department of Energy. Department Circular No. DC2021-06-0013 Section 3 (i) states that commissioning test refers to conduct of procedures to determine and certify that a generating unit was connected to the grid in accordance with the Philippine Grid Code (PGC), Philippine Distribution Code (PDC) and other relevant guidelines and specifications and to determine readiness to deliver energy to the grid or distribution network for the purpose of securing Certificate of Compliance (COC) from the Energy Regulatory Commission (ERC).

1.2. Over-riding Constraints Impositions by Category

During the period in review, a total of 129,090 over-riding constraints impositions attributable to non-security limits⁴ were recorded. These impositions involved 17 generators in Luzon, 12 generators in Visayas, and 9 generators in Mindanao. Notably, most of the impositions classified as security limit⁵ were imposed on plants located in Mindanao grid.

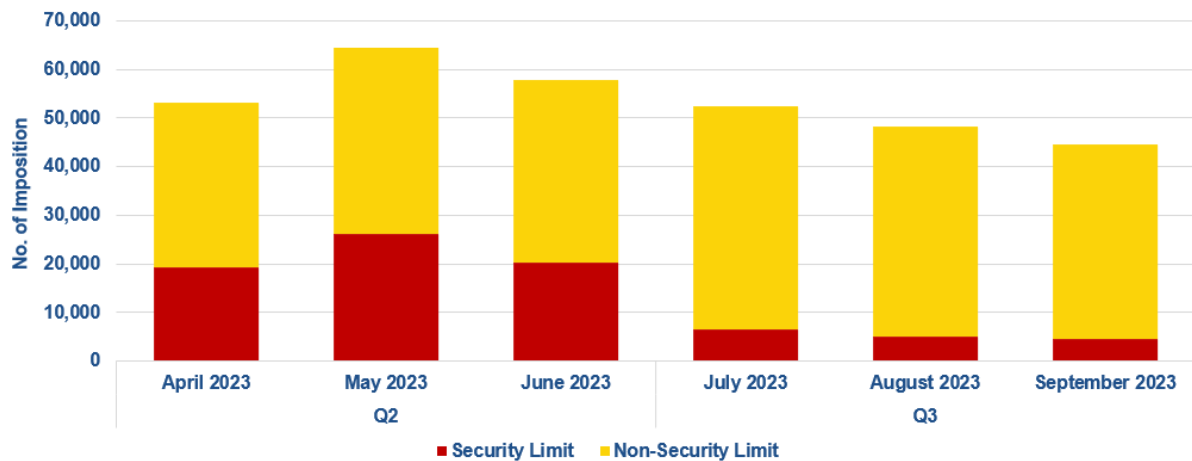


Figure 2. Monthly Comparison of Over-riding Constraints, by Category - System

Delving deeper into the impositions by category and region, a predominant number of impositions related to Must-Run Unit⁶ (MRU) were noted in the Mindanao region mainly to address the system voltage requirements of the grid. As highlighted in Table 1, a decreasing trend is apparent in the MRU impositions during the third quarter attributed to a reduction in the number of plants assigned as MRU.

⁴ WESM Dispatch Protocol Manual Issue 19 Clause 7.6.2 (b) states that non-security limits include testing and commissioning, generating unit limitation, and commercial and regulatory requirement.

⁵ WESM Dispatch Protocol Manual Issue No. 19 Clause 7.6.2 (a) states that the SO may impose security limits to override the market offers and address possible threats in system security.

⁶ Department of Energy. Department Circular No. DC2021-06-0013 provides that MRUs are generating units identified and instructed by the SO to provide additional energy on a particular trading interval to address System Security requirements but the dispatch of which is said to be Out of Merit.

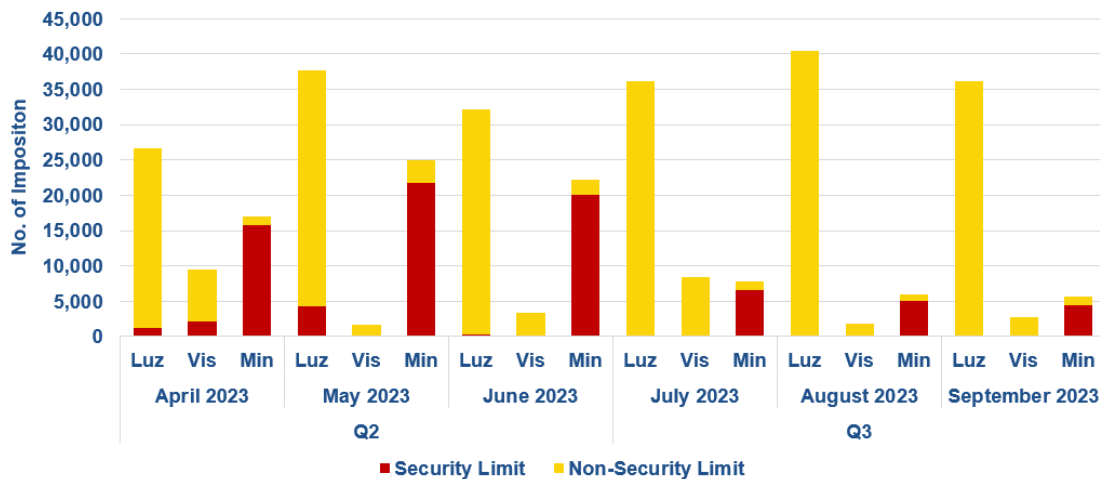


Figure 3. Monthly Comparison of Over-riding Constraints, by Category - Region

Table 1. Summary of Over-riding Impositions by Category

Category	Quarter 2		Quarter 3		Change	
	No. of Events	Percent of Total	No. of Events	Percent of Total	No. of Events	Percent of Change
Security Limit	65,670	37.5%	16,191	11.1%	-49,479	▼ -75.3%
Non-Security Limit	109,589	62.5%	129,090	88.9%	19,501	▲ 17.8%
Total	175,259	100.0%	145,281	100.0%	-29,978	■ -17.1%

▼ Significant Decrease ▲ Significant Increase ■ Neutral (below 20% change)

In comparison to the preceding quarter, there was a noted 17.1 percent decrease in the total number of over-riding impositions. As illustrated in Table 1, there was a rise in the count of non-security limit events imposed by the SO for about 17.8 percent as compared with the observed events in 2nd billing quarter. The number increased from the previous quarter's 109,589 to the current quarter's 129,090, attributed to the initiation of commissioning tests for several plants.

1.3. Over-riding Constraints Impositions by Incident

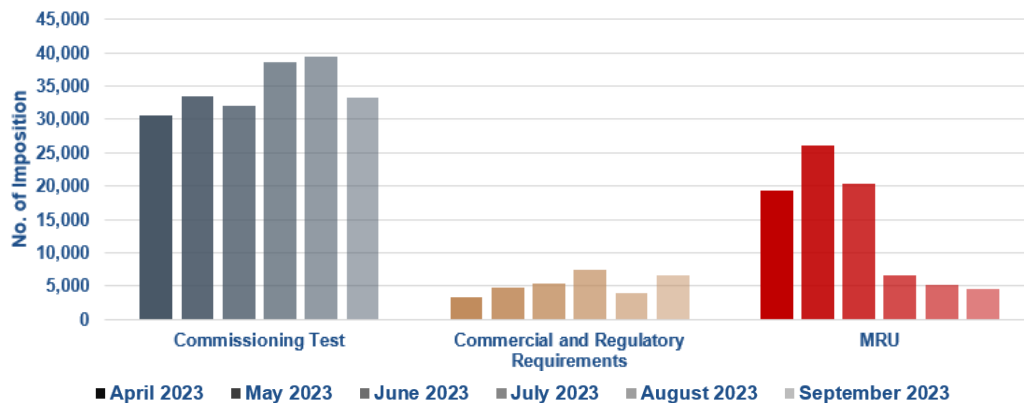





Figure 4. Monthly Comparison of Over-riding Constraints, by Incident

Taking a closer look at the over-riding constraint impositions per incident, a notable trend emerges where commissioning tests are the most frequent reason for imposition of over-riding constraints to generators during the reviewed billing quarter. Particularly, there was an observed minimal increase in such impositions in August 2023, coinciding with the commencement of commissioning tests for several plants. Meanwhile, the decrease noted for the September billing period is mainly attributable to the expiration of commissioning test period of a battery energy storage system.

Shifting focus to MRU impositions, a significant portion of these constraints were imposed in the Mindanao region mainly to address the system voltage requirements in the grid. Comparing the two quarters, there was a significant decrease in the number of MRU impositions in the 3rd quarter as compared to 2nd quarter, from 65,670 events to only 16,191 events.

Table 2. Summary of Over-riding Impositions by Incident

Incident	Quarter 2		Quarter 3		Change	
	No. of Events	Percent of Total	No. of Events	Percent of Total	No. of Events	Percent of Change
Commissioning Test	96,132	54.9%	111,105	76.5%	14,973	15.6%
Commercial and Regulatory Requirements	13,457	7.7%	17,985	12.4%	4,528	33.6%
Must Run Units	65,670	37.5%	16,191	11.1%	-49,479	-75.3%
Total	175,259	100.0%	145,281	100.0%	-29,978	-17.1%

 Significant Decrease
  Significant Increase
  Neutral (below 20% change)

As shown in Table 2, a noticeable uptick is evident in commercial and regulatory requirements testing primarily attributed to a rise in the conduct of ancillary service tests, emission tests, and performance tests. With regards to the commissioning test, a slight increase was observed during the billing period brought about by start of commissioning test of one (1) plant, and extension of commissioning test period of two (2) plants.

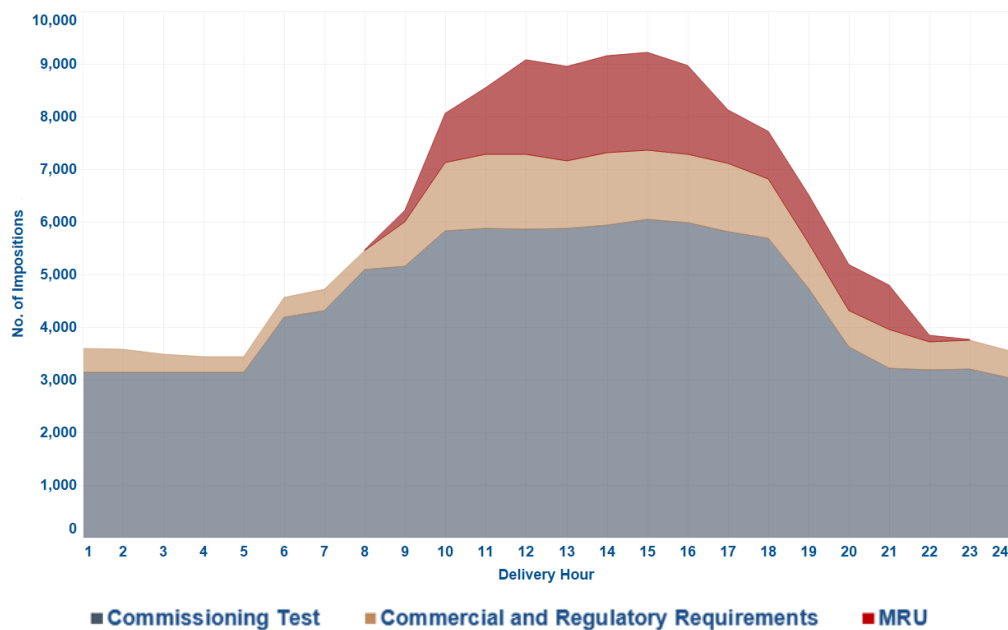


Figure 5. Hourly Profile of Over-riding Impositions per Incident

As shown in Figure 5, the majority of impositions occurred during peak hours from 0800h to 1800h. It can be observed that MRU impositions were exclusively enforced during this timeframe. Additionally, most plants undergoing commissioning tests were also subjected to impositions during peak hours. This was mainly on account of the conduct of commissioning tests of solar plants. Also, it can be seen that impositions of over-riding constraints drop at 2000h.

1.4. Over-riding Constraints Imposition by Plant Type

Among various types of plants in the market, a substantial number of over-riding constraints were imposed on hydro plants followed by coal then solar, wind, and oil-based plants. Conversely, a smaller proportion of impositions was observed for natural gas, battery energy storage systems, and geothermal plants.

Examining the data, in Q3, most impositions come from renewable energy resources. The hydro plants have the highest with a total of 30,368 impositions, making up 20.9 percent of the total impositions. Solar plants followed closely with 25,209 total impositions (17.4 percent), and wind plants with 19,152 impositions (13.2 percent).

Turning to conventional plants, the majority of impositions are in coal plants with 27,612 impositions, constituting 19 percent of the total during the reviewed billing period. Next, oil-based plants have 24,546 impositions (or about 16.9 percent). Natural gas has the lowest imposition among conventional plants, with 3,163 impositions, equivalent to 2.2 percent.

In the field of energy storage systems, batteries recorded 15,201 impositions or 10.5 percent of the total attributable to extension of commissioning test period that was previously expired during the previous quarter.

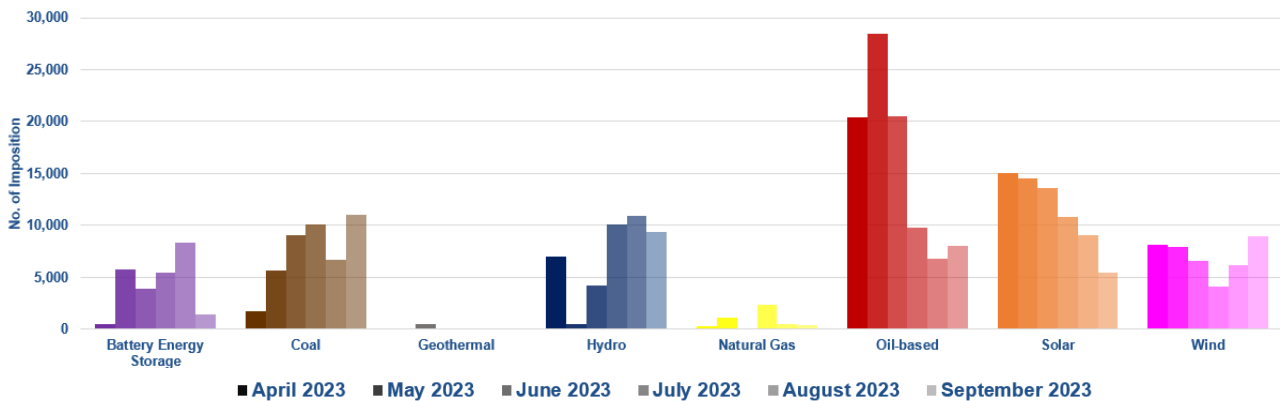


Figure 6. Monthly Comparison of Over-riding Constraints, by Plant Type

When comparing the imposition statistics with the previous quarter, notable changes were observed across several plant types, as shown in Table 3. The significant shift occurred in hydro plants which was primarily attributed to the entry one (1) plant (Tibag HPP) undergoing commissioning test. Also, the uptick in over-riding constraint impositions on natural gas plants was a direct result of increased net dependable capacity tests and performance tests of San Gabriel Avion NGFPP and Sta. Rita NGPP which resulted in increased from 1,409 imposition in Q2 to 3,163 impositions in Q3.

Another noteworthy change was the decline in MRU impositions on oil-based plants, with a decrease observed from 69,452 impositions in Q2 to 24,256 impositions in Q3, majority of which imposed to Mindanao region. Additionally, the completion of the commissioning test period of Pinugay SPP and Currimao 2 SPP led to a decrease in impositions on solar plants.

Table 3. Summary of Over-riding Impositions by Plant Type

Plant Type	Quarter 2		Quarter 3		Change	
	No. of Events	Percent of Total	No. of Events	Percent of Total	No. of Events	Percent of Change
Battery Energy Storage	10,158	5.8%	15,201	10.5%	5,043	▲ 49.6%
Biomass	-	0.0%	-	0.0%	-	■ 0.0%
Coal	16,456	9.4%	27,612	19.0%	11,156	▲ 67.8%
Geothermal	453	0.3%	30	0.0%	-423	▼ -93.4%
Hydro	11,686	6.7%	30,368	20.9%	18,682	▲ 159.9%
Natural Gas	1,409	0.8%	3,163	2.2%	1,754	▲ 124.5%
Oil-based	69,452	39.6%	24,546	16.9%	-44,906	▼ -64.7%
Solar	43,138	24.6%	25,209	17.4%	-17,929	▼ -41.6%
Wind	22,507	12.8%	19,152	13.2%	-3,355	■ -14.9%
Total	175,259	100.0%	145,281	100.0%	-29,978	■ -17.1%

▼ Significant Decrease ▲ Significant Increase ■ Neutral (below 20% change)

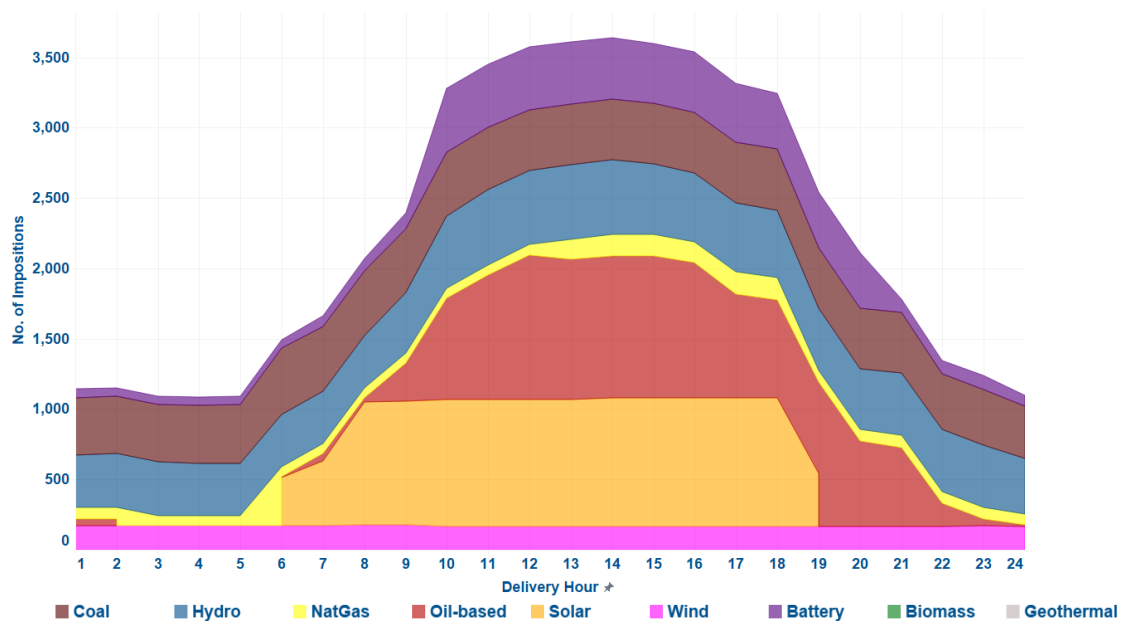


Figure 7. Hourly Profile of Over-riding Impositions per Plant Type

Examining the hourly profile of over-riding constraint impositions per plant type, it can be observed that impositions during daytime are related to the conduct of commissioning tests of solar plants. In addition, chunks of impositions to oil-based plants and battery plants are likewise observed during peak hours. In contrast, wind, hydro, coal, and natural gas plants experienced impositions that are relatively consistent throughout the 24-hour period.

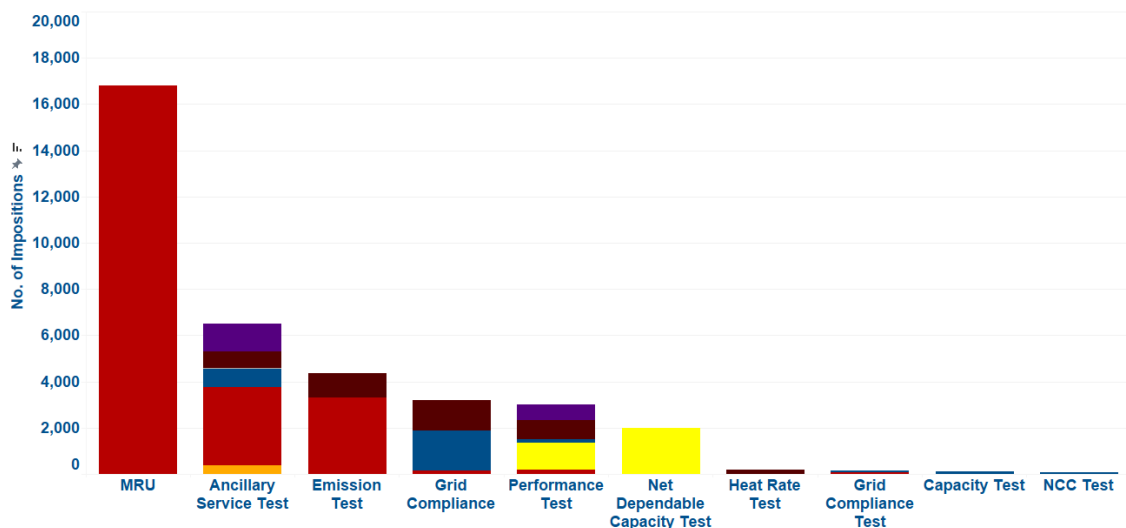


Figure 8. Number of Impositions of Incidents per Plant Type (excluding Commissioning Test)

In terms of incidents per plant type (excluding commissioning tests), it can be observed that all MRU impositions were associated with oil-based plants. Aside from the MRU, ancillary service tests and emission tests are likewise recorded as the top reasons for impositions of SO. In addition, hydro and coal plants predominantly conducted grid

compliance tests during the period, while natural gas plants were mainly involved in performance and net dependable capacity tests.

2. PLANTS UNDER COMMISSIONING TEST

As part of its mandate to monitor trading participants' over-riding constraints⁷ including those plants under commissioning tests, the MSC regularly conducts monitoring of the reasons and if the same is align with the procedures set forth in the Rules, Manuals and relevant issuances.

During the covered period, there was an increase in over-riding constraints attributed to plants undergoing commissioning tests in the 3rd quarter of 2023. This uptick was primarily a result of the commencement of the commissioning test period for one (1) new hydro plant which started during the July 2023 billing period. Additionally, the increase in battery plants can be attributed to the extension of the Provisional Certificate of Approval to Connect (PCATC)⁸ of plants which has previously expired certificate. These plants were subsequently granted a Final Certificate of Approval to Connect (FCATC)⁹ in September 2023, enabling them to submit their nominations in the market.

Furthermore, the completion of the commissioning test periods for Pinugay SPP and Currimao 2 SPP resulted in a reduction in impositions on solar plants in the September 2023 billing period. Similarly, the decrease observed for Mariveles CTPP Unit 1 due to commissioning test is likewise linked to the expiration of its PCATC during August 2023. Subsequently, an extension was granted to the plant in September 2023, leading to an increase in commissioning test impositions during that period.

A similar pattern was noticed in the wind plant in which the decline in July 2023 was due to the expiration of the PCATC for Balaoi and Caunayan WPP. However, an extension was granted, resulting in an increase in impositions during August 2023. Additionally, Calbayog DPP, an oil-based plant, commenced its commissioning test period during Q3 of 2023.

⁷ Market Surveillance Manual Issue 1.0 Section 5.5

⁸ According to the DC2021-06-0013, it is the certification issued by the Transmission Network Provider (TNP) or Distribution Utility (DU) to a Generation Company, allowing the conduct of testing and commissioning with respect to it Generation Facility/ies.

⁹ According to the DC2021-06-0013, it is the certification issued by the TNP or DU to a Generation Company attesting that its Generation Facility/ies is ready to deliver energy to the grid or distribution network in accordance with the PGC, PDC and other relevant guidelines and specification.

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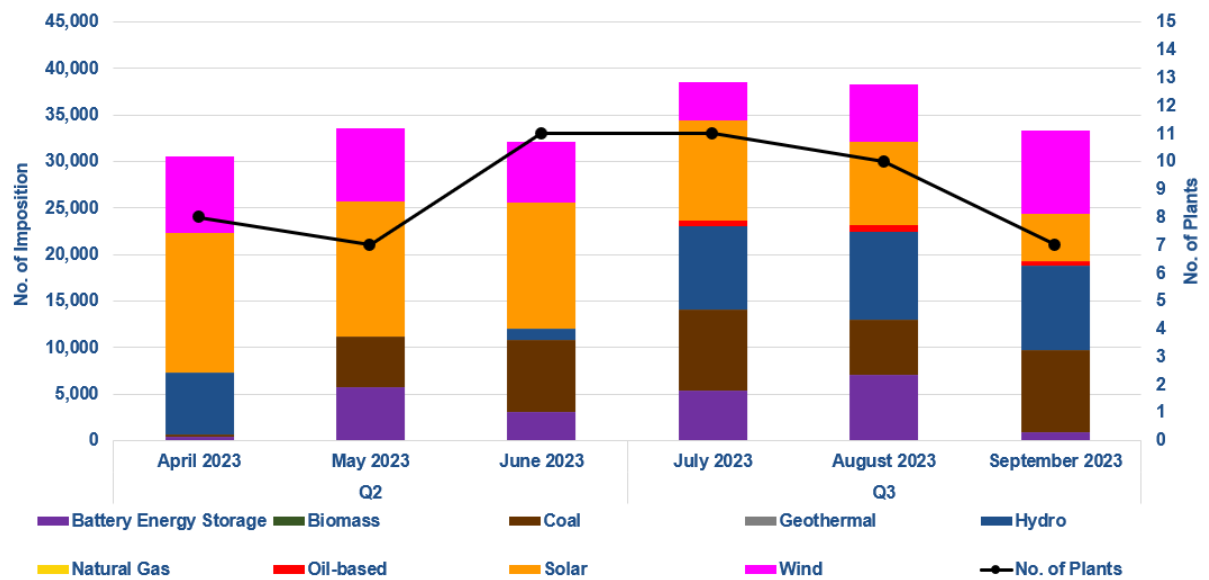


Figure 9. Monthly Comparison of the Over-riding Constraints due to Commissioning Test and Number of Plants

APPENDIX A. LIST OF GENERATING PLANTS WITH OVER-RIDING CONSTRAINTS IMPOSITION

Plant/Unit Name	Plant Type	Registered Capacity (MW) ¹⁰
LUZON		
Ambuklao Hydroelectric Power Plant Unit 1	Hydro	37.5
Ambuklao Hydroelectric Power Plant Unit 2	Hydro	37.5
Ambuklao Hydroelectric Power Plant Unit 3	Hydro	37.5
Arayat-Mexico Solar Power Plant Project Phase 2	Solar	30.8
Balaoi and Caunayan Wind Power Project Phase 1	Wind	80
Concepcion Battery Energy Storage System	Battery	60
Currimaos 2 Solar Power Plant	Solar	68.7
GNPower Dinginin Coal Plant - Unit 1	Coal	668
Bataan Battery Energy Storage System	Battery	40
Bataan Combined Cycle Power Plant Unit 1	Oil-Based	60
Bataan Combined Cycle Power Plant Unit 2	Oil-Based	60
Bataan Combined Cycle Power Plant Unit 3	Oil-Based	60
Bataan Combined Cycle Power Plant Unit 5	Oil-Based	60
Bataan Combined Cycle Power Plant Unit 6	Oil-Based	60
Bataan Combined Cycle Power Plant Unit 7	Oil-Based	60
Magat Battery Energy Storage System	Battery	24
Mariveles Coal-Fired Power Plant 1	Coal	316
Mariveles Coal-Fired Power Plant 2	Coal	316
Mariveles Coal-fired Thermal Power Plant- Phase 1	Coal	150
AES Masinloc Advancion Energy Storage Array	Battery	10
Refinery Solid Fuel-Fired Boiler Power Plant	Coal	140
Bunker-C Fired Thermal Power Plant (BCFDPP)	Oil-Based	110
San Roque Hydro Electric Power Plant Unit 2	Hydro	145
Trust Solar Power Plant	Solar	15.4
Pinugay Solar Power Plant	Solar	71.6
Subplant 2 Alaminos Battery Energy Storage System	Battery	20
San Gabriel Avion Natural Gas-Fired Power Plant Unit 1	Natural Gas	47.2
San Gabriel Avion Natural Gas-Fired Power Plant Unit 2	Natural Gas	45.8
Bacman Geothermal Power Plant Unit 1	Geothermal	60
Bacman Geothermal Power Plant Unit 3	Geothermal	20
Botocan Hydro Electric Power Plant	Hydro	20.8
Caliraya Hydro Electric Power Plant	Hydro	28
Kalayaan Hydro Electric Power Plant 1	Hydro	180
Kalayaan Hydro Electric Power Plant 2	Hydro	180
Kalayaan Hydro Electric Power Plant 3	Hydro	180
Kalayaan Hydro Electric Power Plant 4	Hydro	180
Lower Labayat Hydroelectric Power Plant	Hydro	1.5

¹⁰ As of 27 October 2023

Plant/Unit Name	Plant Type	Registered Capacity (MW) ¹⁰
Malaya Thermal Power Plant Unit 2	Oil-Based	130
Pagbilao Coal-Fired Power Plant 1	Coal	382
Pagbilao Coal-Fired Power Plant 2	Coal	382
Pagbilao 3 Power Plant	Coal	420
Batangas Diesel Power Plant Unit 1	Oil-Based	5.5
Batangas Diesel Power Plant Unit 2	Oil-Based	5.5
San Gabriel Power Plant	Natural Gas	420
Sta. Rita Natural Gas Power Plant 1	Natural Gas	257.3
Sta. Rita Natural Gas Power Plant 2	Natural Gas	255.7
Sta. Rita Natural Gas Power Plant 3	Natural Gas	265.5
Sta. Rita Natural Gas Power Plant 4	Natural Gas	264
San Lorenzo Combined-Cycle Gas Turbine Power Plant Unit 50	Natural Gas	265
San Lorenzo Combined-Cycle Gas Turbine Power Plant Unit 60	Natural Gas	265
Tibag Hydroelectric Power Plant	Hydro	5.8
VISAYAS		
Calbayog Bunker C-Fired Diesel Power Plant	Oil-Based	11.2
Isabel Modular Diesel Power Plant Sector 1	Oil-Based	10
Isabel Modular Diesel Power Plant Sector 2	Oil-Based	10.1
Isabel Modular Diesel Power Plant Sector 3	Oil-Based	15.1
Isabel Modular Diesel Power Plant Sector 4	Oil-Based	10.2
Isabel Modular Diesel Power Plant Sector 5	Oil-Based	15.1
Isabel Modular Diesel Power Plant Sector 6	Oil-Based	10.2
Ormoc Battery Energy Storage System	Battery	40
KSPC Coal Fired Thermal Power Plant Unit 1	Coal	103
KSPC Coal Fired Thermal Power Plant Unit 2	Coal	103
Toledo Battery Energy Storage System	Battery	20
Naga Oil-Fired Power Plant Unit 1	Oil-Based	5.5
Naga Oil-Fired Power Plant Unit 2	Oil-Based	5.5
Naga Oil-Fired Power Plant Unit 3	Oil-Based	5.5
Naga Oil-Fired Power Plant Unit 4	Oil-Based	5.5
Naga Oil-Fired Power Plant Unit 5	Oil-Based	5.5
Naga Oil-Fired Power Plant Unit 6	Oil-Based	5.5
Kabankalan Battery Energy Storage System	Battery	20
Bohol Diesel Power Plant Unit 1	Oil-Based	4
Bohol Diesel Power Plant Unit 2	Oil-Based	4
Bohol Diesel Power Plant Unit 3	Oil-Based	4.2
Bohol Diesel Power Plant Unit 4	Oil-Based	4
Nabas Diesel Power Plant	Oil-Based	6.4
Power Barge 101- Unit 2	Oil-Based	6
Timbaban Hydro Power Plant	Hydro	18.9
MINDANAO		
Misamis Occidental Bunker C-Fired Diesel Power Plant 3	Oil-based	15.5

Plant/Unit Name	Plant Type	Registered Capacity (MW) ¹⁰
Bunker-C Fired Diesel Power Plant Unit 1	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 2	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 3	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 5	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 6	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 7	Oil-based	10
Bunker-C Fired Diesel Power Plant Unit 8	Oil-based	10.1
Bunker-C Fired Diesel Power Plant Unit 9	Oil-based	10.2
Bunker-C Fired Diesel Power Plant Unit 10	Oil-based	10.2
Agus VII Hydroelectric Power Plant Unit 1	Hydro	26.1
Agus VII Hydroelectric Power Plant Unit 2	Hydro	25.3
Pulangi IV Hydroelectric Power Plant Unit 1	Hydro	75
Pulangi IV Hydroelectric Power Plant Unit 2	Hydro	75
Pulangi IV Hydroelectric Power Plant Unit 3	Hydro	75
Surigao Del Sur Power Plant	Oil-based	7.8
Malita Battery Energy Storage System (BESS)	Battery	20
Digos Modular Diesel Power Plant (Units 1-16)	Oil-based	16.9
Mobile 1 Bunker C-Fired Power Plant Unit 1	Oil-based	49
Mobile 1 Bunker C-Fired Power Plant Unit 2	Oil-based	50
Sarangani Coal - Fired Power Plant Phase 1	Coal	118.5
Sarangani Coal - Fired Power Plant Phase 2	Coal	118.5