



**Philippine Electricity
Market Corporation**

MONTHLY FORECAST ACCURACY STANDARDS (FAS) REPORT

(26 December 2021 to 25 November 2022)

**22-February-2023
Enforcement and Compliance Office**



Philippine Electricity
Market Corporation

MONTHLY FAS REPORT

ENFORCEMENT AND COMPLIANCE OFFICE

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A. COVERAGE

This Monthly Forecast Accuracy Standards (FAS) Report covers:

1. Must Dispatch Generating Units (**MDGU**) or plants on commercial operation (Plants on test and commissioning are not yet included)
2. Plants with Final Certificate of Approval to Connect (FCATC) in alignment with the provisions of DOE Department Circular DC 2022-05-0015.¹
3. MDGU plants in Luzon and Visayas. (Plants in Mindanao are not included pending the commercial operation in WESM Mindanao.)
4. For the period 26 December 2021 to 25 November 2022 (**January -November 2022 Billing Period**).

B. RULE REFERENCE

1. FAS Under the Enhanced WESM Design and Operations

On 16 March 2021, the WESM Manual “Procedures for the Monitoring of Forecast Accuracy Standards for Must Dispatch Generating Units” (WESM-FASMD) Issue 2.0 was promulgated by the Department of Energy (DOE). Said manual establishes the procedures for the monitoring, reporting, and review of the FAS for compliance by the must dispatch generating units **under the Enhanced WESM Design and Operations (EWDO)**.

On 25 June 2021, the DOE, through the Department Circular DC2021-06-0015, officially declared the commercial operation of the EWDO which necessitated the launching of the NMMS on 26 June 2021 by IEMOP. PEMC, on the other hand, commissioned the CPMS in view of the directive of the DOE to monitor the compliance of the trading participants in the WESM under the EWDO.

The FAS Manual Issue 2.0 that was promulgated in March 2021 thus became effective on 26 June 2021 or upon such declaration of commercial operation of the EWDO.

PEMC, through the Enforcement and Compliance Office (ECO), has implemented interim procedures in the form of compliance bulletins and advisories to carry out the mandate as contained in the WESM Rules and FAS Manual. In the process, it noted and consolidated various concerns and issues encountered by both ECO and the trading participants, and their observations during the implementation of the FAS monitoring under the EWDO regime. ECO also made consultations with the DOE, the Market Operator, and the trading participants on those matters. As the one-year monitoring period (January-December 2022 billing period) is about to end and the cumulative results are required to be assessed with finality by first quarter of 2023, PEMC deems it appropriate to properly address the gaps and to give effect to the related DOE issuance by filing an Urgent Amendment to FAS Manual 2.0 and the relevant provisions of the WESM Rules.

On 25 November 2022, the WESM Manual “Procedures for the Monitoring of Forecast Accuracy Standards for Must Dispatch Generating Units” (WESM-FASMD) Issue 2.1 became effective after the approval of the PEM Board of Directors.² The amendments made to the FAS Manual 2.1 took effect from the beginning of the year 2022 pursuant to Section 5.3.2 of the said Manual.³

¹ “Supplementing Department Circular No. DC2021-06-0013 on the Framework Governing the Test and Commissioning of Generation Facilities for Ensuring Readiness to Deliver Energy to the Grid or Distribution Network.” Published in DOE Website in June 2022.

² PEM Board Resolution No. 2022-54-06 (Approving the Urgent Amendment to the FAS Manual)

³ “Sec. 5.3.2 The amendments made herein and approved pursuant to the *Procedures for Changes to the WESM Rules, Retail Rules and Market Manuals* shall have a retroactive effect from the beginning of the year that the said amendments are approved, unless the application thereof becomes inequitable and impracticable under the circumstances. For avoidance of doubt, the amended provisions that are given retroactive effect shall be indicated in the PEM Board resolution and/or DOE issuance approving or promulgating them.” *FAS Manual 2.1, 25-Nov-2022*



B. RULE REFERENCE

2. Transition Period

The compliance with the FAS Manual is determined on an annual basis. The Mean Absolute Percentage Error (MAPE) and Percentile 95 (Perc95) of each must dispatch generating unit shall be calculated over the period starting on the 26th of December of a year and ending on the 25th of December of the succeeding year.⁴

As mentioned in the preceding paragraphs, the FAS Manual became effective on 26 June 2021 wherein the WESM switched from one-hour trading interval to 5-minute dispatch intervals. With the changes both in the resolution of trading intervals and the formula and conditions in computing the FAS, it becomes impossible to determine the *annual* compliance with the FAS Manual for 2021, *i.e.*, from January 2021 to December 2021 billing periods.

While the ECO already commenced the compliance monitoring of the FAS in July 2021, the monitoring of the FAS from July to December 2021 billing period was understood to be as the transition period. And with the Urgent Amendment to the FAS Manual on 23-Nov-2022, the provision on transition period was likewise amended for clarity. It now reads –

“4.5.1. A *transition period* shall be six (6) months from the commercial operation of the enhanced *WESM* design and operations unless extended by the *DOE* through appropriate issuance.”

During the transition period, the must dispatch generating units which fail to meet the requisite forecast accuracy standards, as set out in the FAS Manual, shall not be liable for sanctions imposed under the relevant Market Manual.⁵

| Period | Governing Manual | Monitoring Entity | Status |
|-------------------------------|-----------------------------|-------------------|------------------------------------------------|
| Jan – Jun 2021 | FAS Manual 1.0 (Old) | IEMOP | Not subject to sanction |
| July – Dec 2021 | FAS Manual 2.0 (Old) | PEMC | Not subject to sanction (transition period) |
| Jan – Dec 2022 and onwards | FAS Manual 2.0 (Old) | PEMC | Subject to sanction |
| Jan – Dec 2022 and onwards | FAS Manual 2.1 (Current) | PEMC | Subject to sanction |

⁴ Section 4.1.2 of the FAS Manual 2.1

⁵ Section 4.5.2 of the FAS Manual 2.1



B. RULE REFERENCE

3. FAS (MAPE and PERC95) Formula

3.1 Forecast Accuracy Standards

Each must dispatch generating unit shall comply with the following standards with respect to its mean absolute percentage error (MAPE) and percentile 95 of the forecasting error (Perc95)

| Technology | MAPE | PERC95 |
|--------------------|------|--------|
| Run-of-river (ROR) | <9% | <30% |
| Solar | <18% | |
| Wind | | |

MAPE and Perc95 shall be calculated over the period starting on the 26th of December of a year and ending on the 25th of December of the succeeding year. Failure to meet the requisite FAS may be liable for sanctions imposed under Clause 7.2 of the WESM Rules and the Penalty Manual.

Calculating Forecast Percentage Error

The Forecast Percentage Error for a dispatch interval of a must dispatch generating unit shall be calculated using the following formula:

$$FPE_{i,t} = \left| \frac{PQ_{i,t} - MQ_{i,t}}{MQ_{\max,i,bp,t}} \right| \times 100\%$$

Where:

FPE_{i,t} refers to the Forecast Percentage Error (in %) of must dispatch generating unit i for dispatch interval t

PQ_{i,t} refers to the Projected Quantity (in MWh) of must dispatch generating unit i for dispatch interval t. It shall be computed as follows.

$$PQ_{i,t} = \frac{1}{n} \times \frac{IL_{i,t} + PO_{i,t}}{2}$$

Where:

IL_{i,t} refers to the Initial Loading (in MW) of must dispatch generating unit i for dispatch interval t used in the scheduling process

PO_{i,t} refers to the Projected Output (in MW) of must dispatch generating unit i or dispatch interval t used during the scheduling process

n refers to the number of dispatch interval(s)



B. RULE REFERENCE

$MQ_{i,t}$ refers to the Metered Quantity (in MWh) of must dispatch generating unit i for dispatch interval t as provided by the Metering Services Provider

$MQ_{max,i,bp,t}$ refers to the Maximum Metered Quantity (in MWh) of must dispatch generating unit i during billing period where dispatch interval t belongs as provided by the Metering Services Provider

3.2 Calculating Mean Absolute Percentage Error (MAPE)

The MAPE is the average of the Forecast Percentage Errors for a given period. It is calculated as follows.

$$MAPE_{i,p} = \frac{\sum_{t=1}^{n_p} FPE_{i,t}}{n_p}$$

Where:

$MAPE_{i,p}$ refers to the mean absolute percentage error (in %) of must dispatch generating unit i for period p

n_p refers to the number of dispatch intervals within period p wherein forecast percentage errors were calculated

$FPE_{i,t}$ refers to the forecast percentage error (in %) of must dispatch generating unit i for dispatch interval t calculated in accordance with Section 4.2.3

3.3 Calculating Perc95

The Perc95 of a must dispatch generating unit for a period shall refer to the value (in %) not exceeding 95% of the forecast percentage errors of the must dispatch generating unit during the period and shall be calculated using the NIST method.

For a more detailed explanation of the NIST Method for Calculating Percentiles, please refer to Appendix A of the FAS Manual.

3.4 Additional Provision in Calculation

Section 4.2 of the FAS Manual Issue 2.0 also provides for the following conditions to be considered in the calculation of forecast percentage errors for each dispatch interval:

- “4.2.5 A one hundred (100) percent FPE shall be imposed to a must dispatch generating unit on a particular dispatch interval where its maximum metered quantity is equal to zero (0) and a projected quantity is not equal to zero (0).



B. RULE REFERENCE

4.2.6 A one hundred (100) percent FPE shall be imposed to a must dispatch generating unit for non-submission of projected output.

4.2.7 A zero (0) percent FPE shall be imposed to a must dispatch generating unit on a particular dispatch interval where its projected quantity and maximum metered quantity are equal to zero (0).”

4.2.8 For generating plants with expansion unit that is either on test and commissioning or in actual operation, as may be allowed by the rules, but is awaiting the issuance of the Certificate of Compliance (COC) or the Provisional Authority to Operate, the following shall apply:

- a) A zero (0) FPE shall be imposed if the projected quantity is less than the combined metered quantity.
- b) A one hundred (100) FPE shall be imposed if the projected quantity is greater than the combined metered quantity.

For this purpose, the combined metered quantity shall refer to the sum of the metered quantity of the existing capacity unit and that of the expansion unit.

This provision shall apply until the registered Pmax of the power plant or facility is updated in the WESM to include both the capacity of the existing and expansion unit.”

3.5 Exclusions

Forecast percentage errors occurring on the following conditions shall be excluded from the calculation of the MAPE and Perc95 of must dispatch generating units based on Section 4.3 of the FAS Manual:

- 3.5.1 The dispatch target of the must dispatch generating unit was restricted below its projected output;
- 3.5.2 The output of the must dispatch generating unit was restricted by the System Operator¹³ as indicated in the System Operator’s report submitted to the Market Operator in accordance with the WESM Rules;
- 3.5.3 A market suspension or market intervention was declared for the dispatch interval;
- 3.5.4 An outage resulted in its derating; or
- 3.5.5 A natural calamity (e.g., typhoon, landslide) affected the ability of the must dispatch generating unit to forecast accurately.
- 3.5.6 Any variance in the market data used in the calculation of MAPE and/or PERC95 that may be discovered during the monitoring and assessment must be properly addressed, validated, and verified within the prescribed timeline. The Generation Company shall provide adequate supporting documents to substantiate any claim of data variance. Only those data that have been proven and verified to be inaccurate, inconsistent, or erroneous shall be considered in the recalculation of the results. *(As amended via PEM Board Resolution No. 2022-54-06)*

The exclusions and other basis of recalculation are already incorporated in the Final FAS Result by ECO, considering data and information provided by the Trading Participants.



B. RULE REFERENCE

4. Penalty/Sanctions

Item 4 of the Section 5 (Schedule of Breach and Penalties) of the WESM Penalty Manual provides for the following:

- 4.1 Type of Breach: Failure to comply with forecast accuracy standards in respect to projected output submitted for a must dispatch generating unit.

One breach is counted for each year that the failure occurs.

One breach is counted for each category of forecast accuracy standard that was not complied with. That is, failure to comply with the prescribed mean absolute percentage error (MAPE) and failure to meet the prescribed percentile 95 of the forecasting error (Perc95) are counted as separate breaches even if they occur on the same periods.

- 4.2 The MDGU that is in operation for less than a year and is found in breach of *MAPE* or *PERC95*, shall be:

- a) imposed a penalty in proportion to the number of months in operation during the covered monitoring year. For instance, the plant commenced operation on 26 March, the financial penalty to be imposed shall be in proportion to the nine (9) billing months over the twelve (12) month-period.
- b) exempted from liability, if it commences operation within three (3) months prior to the end of the covered monitoring year.

A *must dispatch generating unit* shall be considered in operation upon commencement of its operation or participation in the *WESM* either by virtue of the Final Certificate of Approval to Connect or the commercial operation registration in the *WESM*, whichever is applicable.

- 4.3 Applicable Penalty: Level 1 – Reprimand; Level 2 - Financial Penalties; Level 3 – Escalated Financial Penalties; Suspension and Deregistration

- 4.4 Financial Penalty: PhP500,000/Breach of MAPE; and PhP500,000/Breach of PERC95

4.4.1 Level 2: PhP500,000/Breach of MAPE; and PhP500,000/Breach of PERC95

4.4.2 Level 3 (Escalated Penalty: PhP1,000,000/Breach of MAPE; and PhP1,000,000/Breach of PERC95

C. FAS CALCULATION, VALIDATION, AND PUBLICATION PROCEDURE

1. Processes and Timelines of Activities

1.1 Publication of Results

The Prelim FASR published by ECO is based on the data gathered from the Independent Electricity Market Operator of the Philippines (IEMOP) and the application of the formula set in the FAS Manual.



C. FAS CALCULATION, VALIDATION, AND PUBLICATION PROCEDURE

1.2 Validation

The trading participants will have the opportunity to review the monthly initial results of MAPE and PERC95.

The trading participants may submit request for exclusion of dispatch intervals and/or replacement of data for a specific dispatch interval within the current billing month through Accomplished FAS Forms together with the relevant evidence and justifications.

The requested action by TP will be subject to the validation by ECO.

1.3 Publication of Final Results

The Final FASR will be issued after due verification and assessment of the relevant data or information.

In summary –

| Process | Report/Forms | Platform/Tool | Timeline |
|---------------------------------------------|------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------|
| Publication of the Initial FAS Results | Preliminary Monthly FASR | CPEMS | Within 30 calendar days from the end of the calendar month of the covered monitoring period. |
| Validation by TP | Accomplished FAS Form (AFASF) | FTP | Within 15 calendar days from the publication of Preliminary Monthly FASR |
| Validation by ECO | Submitted AFASF and Supporting Documents | CPEMS | Within 15 calendar days from the receipt of AFASF |
| Publication of the Final FAS Results | Final Monthly FASR | CPEMS | Within seventy (70) calendar days from the end of the calendar month of the covered monitoring period. |
| Publication of the Annual Final FAS Results | Annual FASR | CPEMS | On or before 31 March of the year following the covered monitoring year. |



D. OVERALL FAS RESULTS

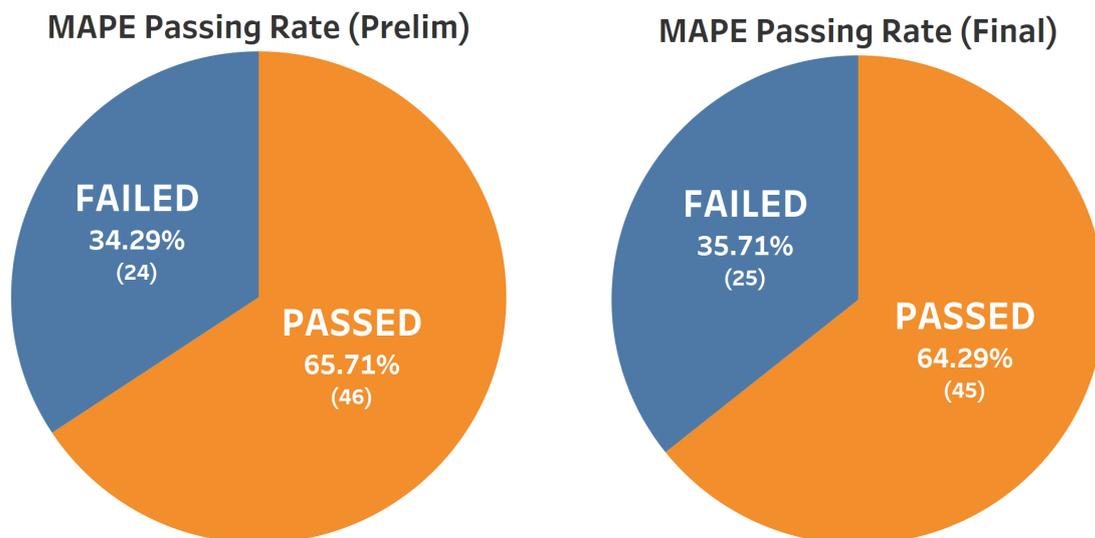
This monthly report covers the cumulative results of the MAPE and PER95 monitoring of MDGUs in **Luzon and Visayas** covering **January to November 2022**. Considered in the calculation of the FAS results are the exclusions and other basis for recalculation mentioned in Section (B) (3.5) of this Report.

As of 25 November 2022, there are 88 facilities registered as MDGU in the WESM. From the registered facilities, 70 facilities from Luzon and Visayas region are being monitored; 3 facilities are under test and commissioning; and the remaining 15 plants pertain to Mindanao plants / facilities which are exempted from the evaluation as the commercial operation of the WESM Mindanao commenced only on 26 January 2023. (DOE DC2022-12-0039, 23 December 2022)

| Technology | No. of Resources in Luzon | No. of Resources in Visayas | No. of Resources in Mindanao | Total |
|--------------|---------------------------|-----------------------------|------------------------------|-----------|
| Run of River | 17 | 3 | 10 | 30 |
| Solar | 34 | 12 | 5 | 51 |
| Wind | 5 | 2 | 0 | 7 |
| Total | 56 | 17 | 15 | 88 |

Table 1. Summary of WESM Registration on Must Dispatch Generating Units as of 25 November 2022

MAPE PRELIM VS. FINAL FAS RESULTS



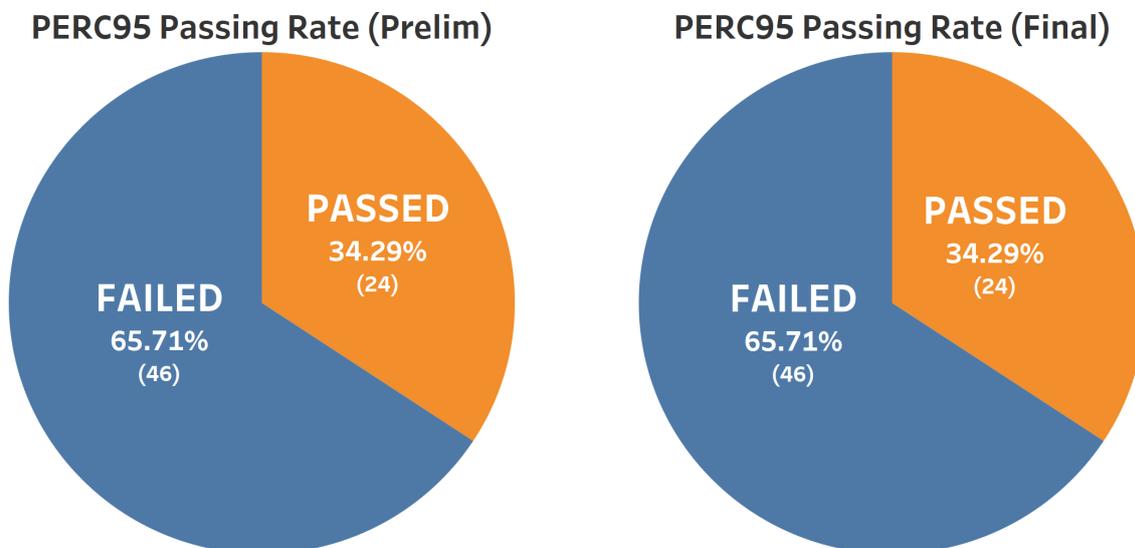
Graph 1. MAPE FAS Results vs. Final FAS Results for Luzon and Visayas

Graph 1 shows the comparison of MAPE Preliminary Forecast Accuracy Standards Results (Prelim FASR) and Final Forecast Accuracy Standards Results (Final FASR) for Luzon and Visayas must dispatch generators.



D. OVERALL FAS RESULTS

- From the initial results of monitoring of MAPE, it appears that 46 out of 70 facilities performed within the <9% and <18% threshold and recorded a MAPE passing rate of 65.71%, while 24 out of 70 facilities failed to meet the MAPE standards.
- The ECO performed validation and recalculation, as stated in Section C of this report, and determined the Final FASR-MAPE. There was a slight decline in the overall rating of Final FASR-MAPE after such re-validation/recalculation recording 64.29% or 1.42% lower than the previously recorded MAPE of 65.71%. One (1) facility failed in MAPE after said recalculation.



Graph 2. PERC95 Prelim FAS Results vs. Final FAS Results for Luzon and Visayas

Graph 2, on the other hand, shows the comparison of PERC95 Prelim FASR and Final FASR for Luzon and Visayas MDGUs.

- The initial computation of the PERC95 yielded the following results: 24 out 70 facilities performed within the <30% threshold or a PERC95 passing rate of 34.29%.
- The ECO likewise performed validation and recalculation, as stated in Section C of this report, and determined the Final FASR-PERC95. It must be noted that there was no change in the overall rating of Final FASR-PERC95 after such re-validation/recalculation.



D. OVERALL FAS RESULTS

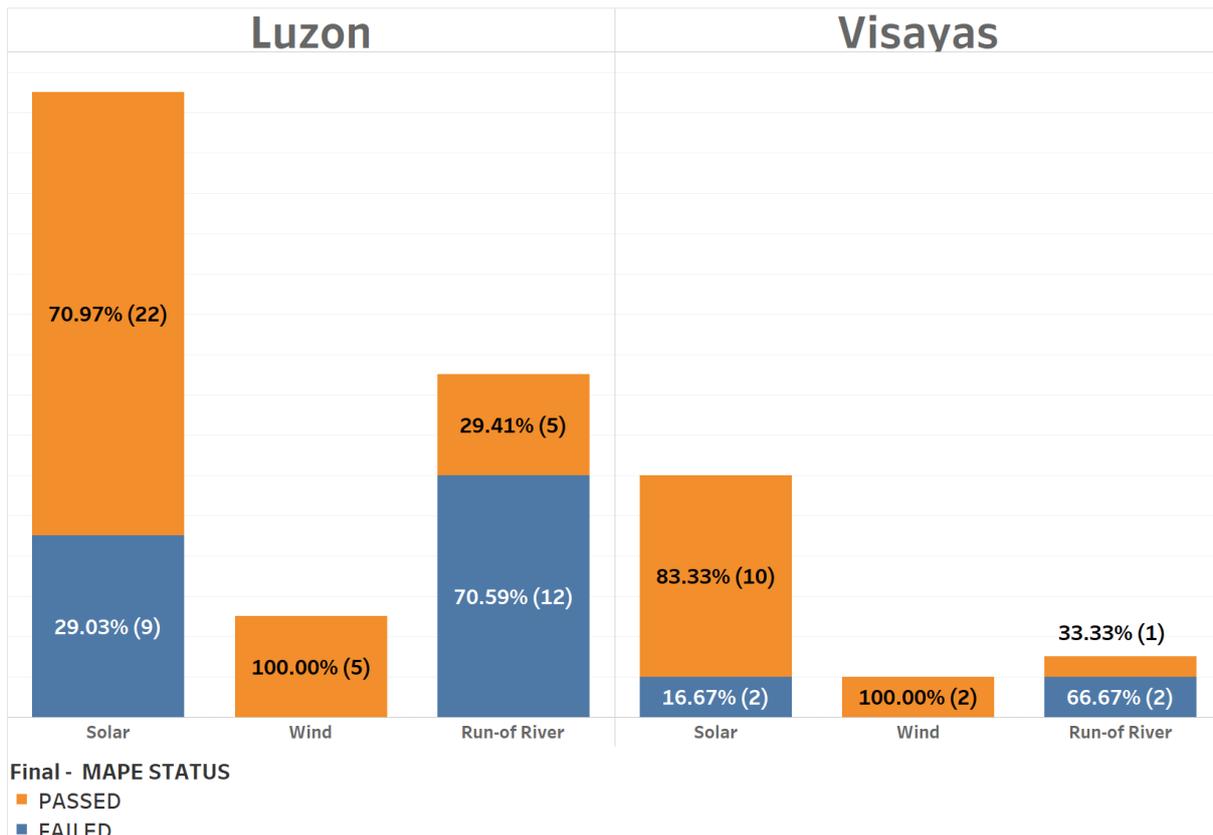
BY REGION AND RESOURCE TYPE

The MAPE and PERC95 performance of MDGUs was assessed per region and per technology and compared them based on the Preliminary FAS Results and Final FAS Results.

For MAPE

- In Luzon region, majority of facilities are attributed to solar power plants, where twenty-two (22) out of thirty-one (31) facilities performed within the MAPE threshold resulting to a passing rating of 70.97%. On the other hand, all the facilities under Wind technology passed the MAPE standards resulting to a 100% passing rate. For ROR technology, only five (5) facilities passed the MAPE standards resulting to 29.41% passing rate.
- In Visayas region, seventeen (17) facilities are being monitored, where ten (10) out of twelve (12) facilities under Solar technology had a passing rating of 83.33% and 16.67% had a failure rate. On the other hand, 100% of facilities under Wind technology passed the MAPE standards. For ROR technology, one (1) facility passed the MAPE resulting to 33.33% passing rate and two (2) facilities failed to meet the standard.

See Graph 3 below for the summary illustration:



Graph 3. MAPE Prelim vs. Final Performance of MDGUs per Region/Technology for Luzon and Visayas

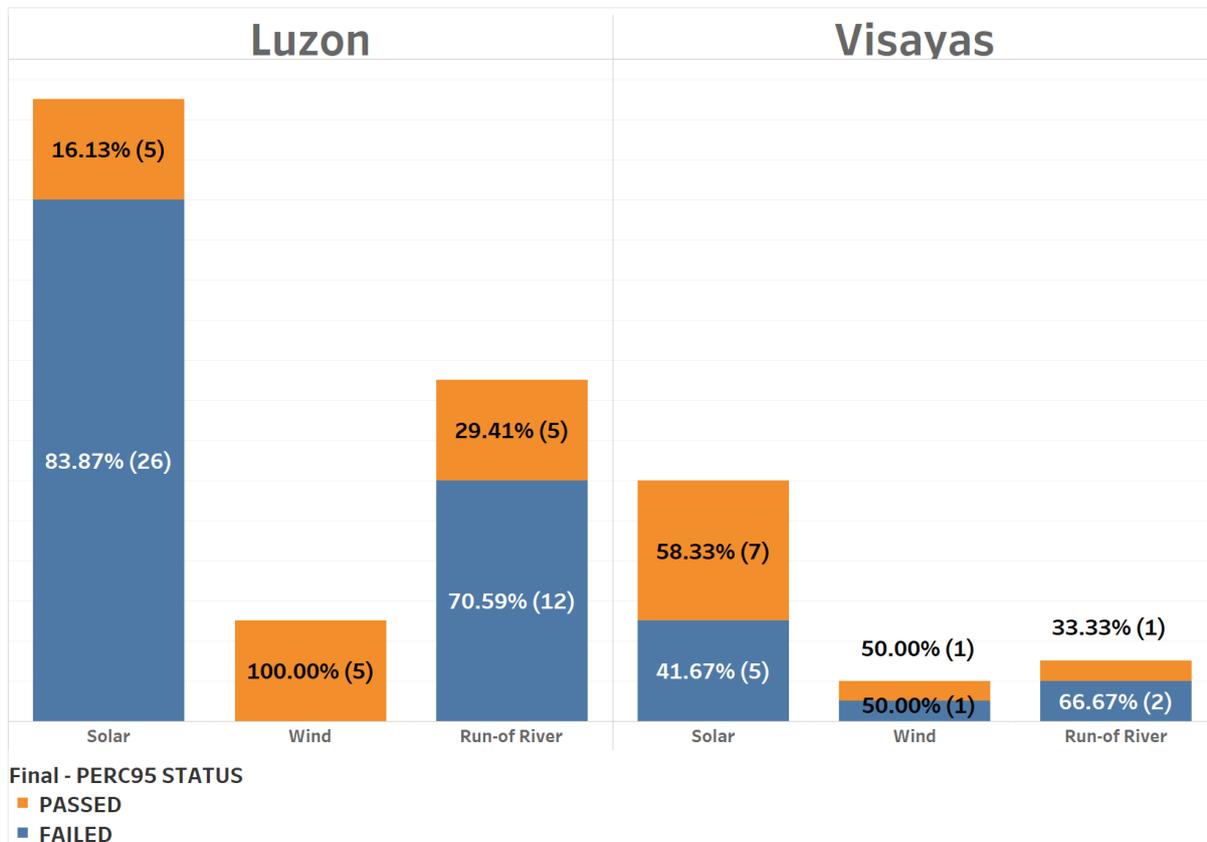


D. OVERALL FAS RESULTS

For PERC95

- In Luzon region, majority of facilities are solar power plants, where only five (5) out of thirty-one (31) facilities passed the MAPE with a passing rate of 16.13%. On the other hand, 100% of facilities under Wind technology passed the PERC95 standards. For ROR technology, only five (5) facilities passed the PERC95 standards giving a 29.41% passing rate.
- In Visayas region, seventeen (17) facilities are being monitored, where seven (7) out of twelve (12) facilities performed within the MAPE standards resulting in a passing rate of 58.33%. On the other hand, facilities under Wind technology had a passing rate of 50%. For ROR technology, one (1) of the three (3) facilities in Visayas passed the PERC95 standards, thus recording a 33.33% passing rate.

See below Graph 4 for summary results –



Graph 4. PERC95 Prelim vs Final Performance of MDGUs per Region/Technology for Luzon and Visayas



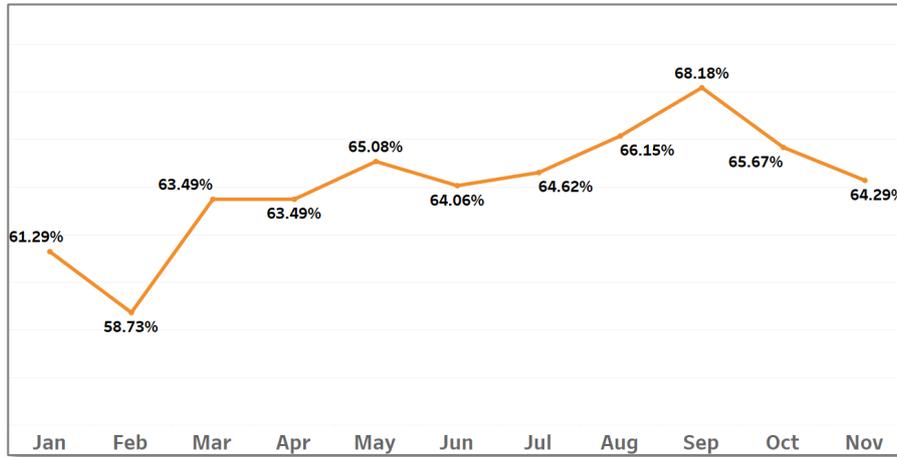
D. OVERALL FAS RESULTS

MONTHLY PASSING RATE TREND

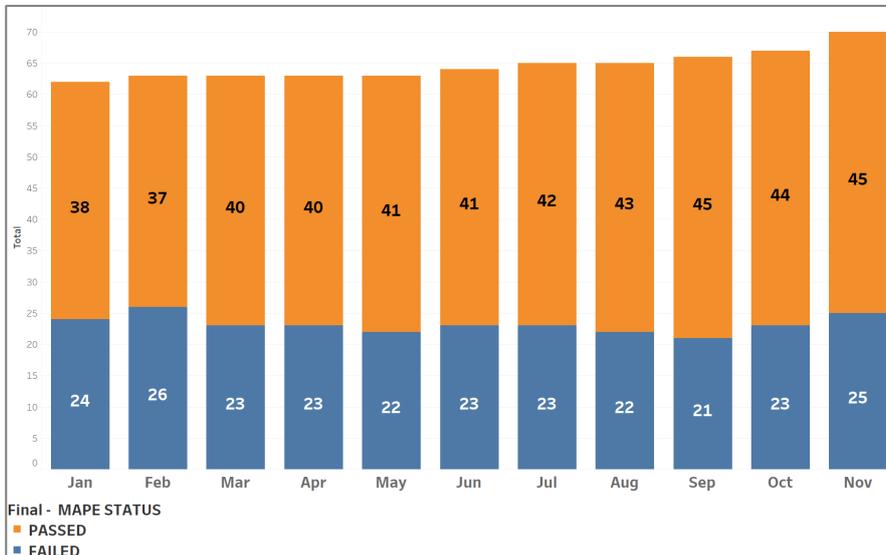
Graph 5 below shows the MAPE overall monthly passing rate trend. It may be noticed that the lowest passing rate from the period January to November 2022 was observed in February 2022, while the highest passing rate of 68.18% was observed in September 2022.

Graph 6 shows that in November 2022, two (2) facilities were added in the count of plants who failed to meet the MAPE standards which is also the reason for the decline in the overall passing rate.

The average MAPE passing rate from January 2022 to November 2022 is 64.1% while the average number of plants which passed MAPE was 42.



Graph 5 – MAPE Passing Rate Trend Jan-Nov 2022



Graph 6 – MAPE Count of Passing Plant Jan-Nov 2022

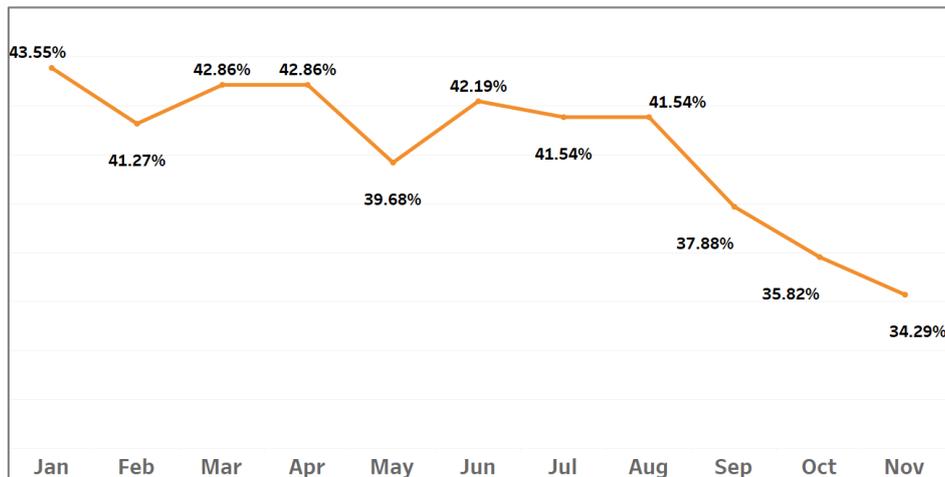


D. OVERALL FAS RESULTS

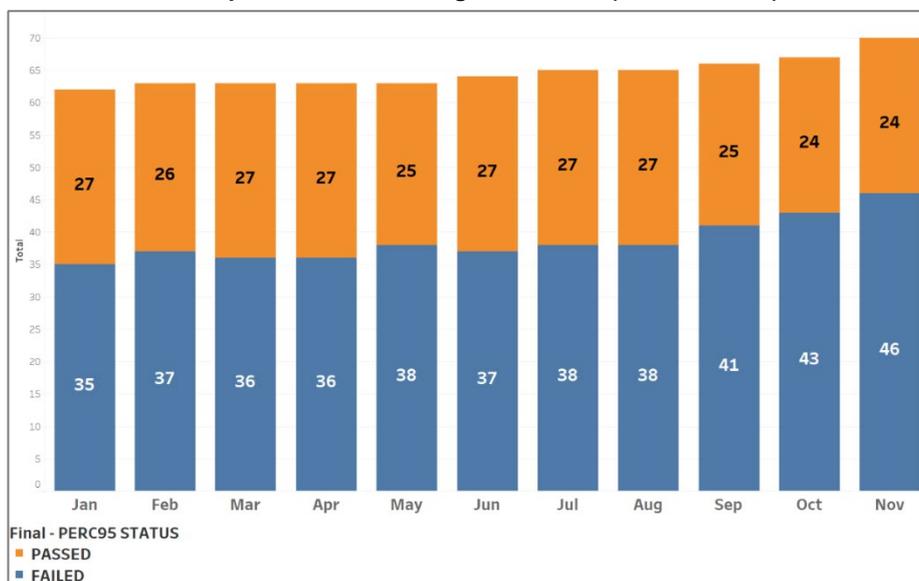
Graph 7 below shows the PERC95 overall monthly passing rate trend. It was observed that the lowest passing rate from January to November 2022 was observed in November 2022, while the highest passing rate of 43.55% was observed in January 2022.

It is observed that majority of the must dispatch generating units are being challenged by the PERC95 obligation, which causes the continuous downtrend in the passing rate since January 2022 up to November 2022. Graph 8 shows that in November 2022, two (2) facilities were added in the count of plants who failed the PERC95 standards.

The average PERC95 passing rate from January 2022 to November 2022 is 39.77%. An average of 26 plants passed the PERC95 throughout the period.



Graph 7 – PERC Passing Rate Trend (Jan-Nov 2022)



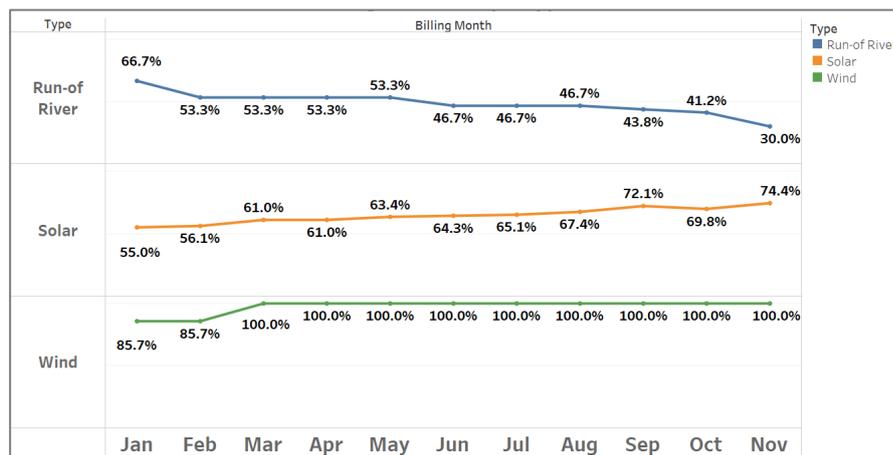
Graph 8 – PERC95 Count of Passing Plant (Jan-Nov 2022)



D. OVERALL FAS RESULTS

The MAPE average passing rates of Solar, Wind, and ROR power plants from the result are 64.51%, 97.40% and 48.63%, respectively. The average number of passing Solar, Wind and ROR power plants are 27, 7, and 8, respectively.

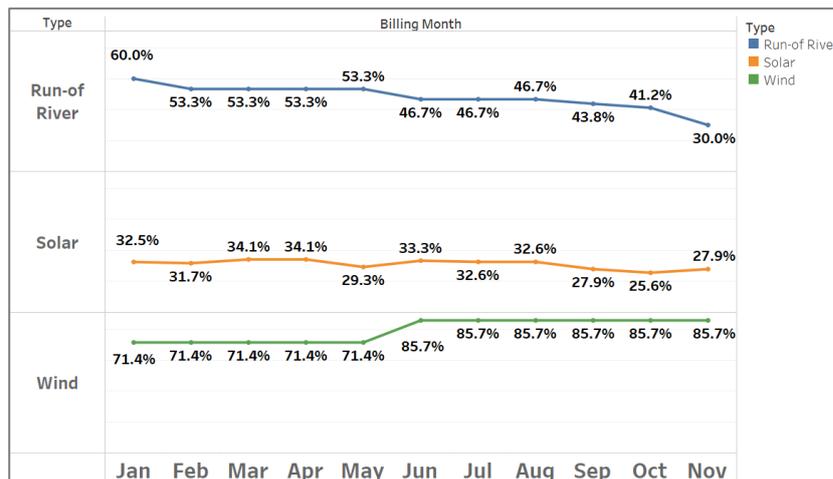
It is observed in Graph 9 that the Solar and Wind power plants have an improving performance in MAPE which reflects a continuous uptrend in their passing rates. The performance of ROR plants in MAPE is continuously declining since January 2022.



Graph 9 – MAPE Passing Rate Trend per Generator Type (Jan-Nov 2022)

On the other hand, the average passing rates of Solar, Wind and ROR power plants are 30.21%, 79.22% and 48.02%, respectively. The average number of plants which passed the PERC95 throughout the period were 27, 9, and 7, respectively.

As shown in Graph 10, the Wind power plants have a high passing rate since January 2022 and continuously improving until November 2022 while the Solar and Wind power plants both registered a low passing rate, i.e., below 50%.



Graph 10 – PERC95 Passing Rate Trend per Generator Type (Jan-Nov 2022)



E. MAPE RESULTS

The table below shows the running MAPE results for each MDGU in Luzon and Visayas as of November 2022. The summary MAPE performance rating refers to the **November 2022 Prelim FASR and Final FASR**.

Fifteen (15) facilities had improved MAPE results in their Final FASRs, while the final monthly rating for seven (7) facilities had declined after re-validation and/or recalculation. There was no change in the ratings with respect to the other forty-eight (48) facilities. Improved recalculated ratings are indicated in GREEN font, while ratings which declined are noted in RED.

Table 2. Individual Performance of MDGUs (Running MAPE)

| Resource Name | MAPE Performance as of November 2022 | |
|---------------------------|--------------------------------------|----------------|
| | Prelim FASR | Final FASR |
| RUN-OF-RIVER (ROR) | | |
| 01AMPHAW_G01 | 3.18% | 3.12% |
| 01BAKSIP_G01 | 2.68% | 2.66% |
| 01BAKUN_G01 | 2.16% | 2.16% |
| 01BINENG_G01 | 24.10% | 24.06% |
| 01BUTAO_G01 | 87.88% | 87.88% |
| 01NMHC_G01 | 18.30% | 18.21% |
| 01NMHC_G03 | 29.29% | 29.24% |
| 01SABANG_G01 | 1.99% | 1.83% |
| 01SLANGN_G01 | 9.66% | 9.59% |
| 01SMBELL_G01 | 2.97% | 2.97% |
| 03BALUG_G01 | 11.08% | 11.08% |
| 03BART_G01 | 107.47% | 108.32% |
| 03CLBATO_G01 | 12.04% | 12.04% |
| 03INARI_G01 | 92.01% | 92.01% |
| 03MAJAY_G01 | 9.46% | 9.46% |
| 03PALAK_G01 | 12.03% | 12.03% |
| 03UPLAB_G01 | 64.55% | 64.55% |
| 04TAFT_G01 | 63.72% | 60.75% |
| 08SUWECO_G01 | 1.51% | 1.51% |
| 08TIMBA_G01 | 56.08% | 56.08% |
| SOLAR | | |
| 01ARAYSOL_G01 | 58.48% | 58.48% |
| 01ARMSOL_G01 | 20.51% | 20.51% |
| 01BOSUNG_G01 | 95.63% | 95.63% |



E. MAPE RESULTS

| Resource Name | MAPE Performance as of November 2022 | |
|---------------|--------------------------------------|------------|
| | Prelim FASR | Final FASR |
| 01BTNSOL_G01 | 8.34% | 8.34% |
| 01BTSOLEN_G01 | 4.79% | 27.51% |
| 01BULSOL_G01 | 21.68% | 21.68% |
| 01BURGOS_G02 | 21.49% | 21.61% |
| 01BURGOS_G03 | 21.93% | 22.02% |
| 01CABSOL_G01 | 10.36% | 10.36% |
| 01CLASOL_G01 | 16.16% | 16.16% |
| 01CONSOL_G01 | 15.57% | 15.57% |
| 01DALSOL_G01 | 15.08% | 15.08% |
| 01GIGSOL_G01 | 3.87% | 3.87% |
| 01MAEC_G01 | 8.26% | 8.26% |
| 01MARSOL_G01 | 16.18% | 16.28% |
| 01PETSOL_G01 | 5.28% | 5.28% |
| 01PETSOL_G02 | 6.07% | 6.07% |
| 01RASLAG_G01 | 11.18% | 11.18% |
| 01RASLAG_G02 | 11.35% | 11.35% |
| 01SPABUL_G01 | 7.63% | 7.63% |
| 01SUBSOL_G01 | 5.40% | 4.07% |
| 01TERASU_G01 | 5.05% | 5.04% |
| 01YHGRN_G01 | 17.96% | 17.96% |
| 01ZAMSOL_G01 | 6.53% | 6.53% |
| 02ECOPRK_G01 | 6.00% | 6.00% |
| 02ECOTAGA_G01 | 7.21% | 7.21% |
| 02SMNRTH_G01 | 64.99% | 64.99% |
| 02VALSOL_G01 | 7.18% | 7.18% |
| 03ADISOL_G01 | 65.32% | 65.32% |
| 03CALSOL_G01 | 13.48% | 13.48% |
| 03SOLACE_G01 | 5.57% | 5.56% |
| 04PHSOL_G01 | 6.03% | 6.03% |
| 04SEPSOL_G01 | 4.00% | 3.99% |
| 05TOLSOL_G01 | 19.75% | 19.84% |
| 06CARSOL_G01 | 3.55% | 3.55% |
| 06HELIOS_G01 | 5.50% | 5.50% |



E. MAPE RESULTS

| Resource Name | MAPE Performance as of November 2022 | |
|---------------|--------------------------------------|------------|
| | Prelim FASR | Final FASR |
| 06MANSOL_G01 | 3.61% | 3.61% |
| 06MNTSOL_G01 | 4.32% | 4.32% |
| 06SACASL_G01 | 9.38% | 9.38% |
| 06SACASL_G02 | 11.37% | 11.37% |
| 06SACSUN_G01 | 4.85% | 3.08% |
| 06SLYSOL_G01 | 16.86% | 16.99% |
| 08COSMO_G01 | 63.29% | 63.27% |
| WIND | | |
| 01BURGOS_G01 | 9.02% | 9.01% |
| 01CAPRIS_G01 | 4.16% | 4.16% |
| 01NWIND_G01 | 4.77% | 4.77% |
| 01NWIND_G02 | 5.18% | 5.18% |
| 03AWOC_G01 | 6.24% | 6.24% |
| 08PWIND_G01 | 13.10% | 13.10% |
| 08SLWIND_G01 | 4.20% | 4.20% |

F. PERC95 RESULTS

Table 3, on the other hand, shows the running PERC95 for each MDGU in Luzon and Visayas as of November 2022. The PERC95 summary performance rating refers to the **November 2022 Prelim FASR and Final FASR**.

Ten (10) facilities had improved PERC95 results, while the final monthly rating for two (2) facilities had declined after re-validation and/or recalculation. There was no change in the ratings with respect to the other fifty-six (56) facilities. Improved recalculated ratings are indicated in GREEN font, while ratings which declined are noted in RED.

Table 3. Individual Performance of MDGUs (Running PERC95)

| Resource Name | PERC95 Performance as of November 2022 | |
|---------------------------|----------------------------------------|------------|
| | Prelim FASR | Final FASR |
| RUN-OF-RIVER (ROR) | | |
| 01AMPHAW_G01 | 10.95% | 10.84% |
| 01BAKSIP_G01 | 6.33% | 6.31% |
| 01BAKUN_G01 | 7.86% | 7.86% |
| 01BINENG_G01 | 100.00% | 100.00% |



F. PERC95 RESULTS

| Resource Name | PERC95 Performance as of November 2022 | |
|----------------|----------------------------------------|------------|
| | Prelim FASR | Final FASR |
| 01BTSOLE_N_G01 | 24.16% | 100.00% |
| 01BUTAO_G01 | 100.00% | 100.00% |
| 01NMHC_G01 | 100.00% | 100.00% |
| 01NMHC_G03 | 100.00% | 100.00% |
| 01SABANG_G01 | 6.11% | 5.93% |
| 01SLANGN_G01 | 100.00% | 100.00% |
| 01SMBELL_G01 | 5.71% | 5.72% |
| 03BALUG_G01 | 43.06% | 43.06% |
| 03BART_G01 | 439.06% | 439.06% |
| 03CLBATO_G01 | 60.85% | 60.85% |
| 03INARI_G01 | 100.00% | 100.00% |
| 03MAJAY_G01 | 30.91% | 30.91% |
| 03PALAK_G01 | 47.97% | 47.97% |
| 03UPLAB_G01 | 100.00% | 100.00% |
| 04TAFT_G01 | 100.00% | 100.00% |
| 08SUWECO_G01 | 2.80% | 2.80% |
| 08TIMBA_G01 | 100.00% | 100.00% |
| SOLAR | | |
| 01ARAYSOL_G01 | 100.00% | 100.00% |
| 01ARMSOL_G01 | 100.00% | 100.00% |
| 01BOSUNG_G01 | 130.11% | 130.11% |
| 01BTNSOL_G01 | 41.65% | 41.65% |
| 01BULSOL_G01 | 100.00% | 100.00% |
| 01BURGOS_G02 | 100.00% | 100.00% |
| 01BURGOS_G03 | 100.00% | 100.00% |
| 01CABSOL_G01 | 44.55% | 44.55% |
| 01CLASOL_G01 | 100.00% | 100.00% |
| 01CONSOL_G01 | 69.34% | 69.34% |
| 01DALSOL_G01 | 100.00% | 100.00% |
| 01GIGSOL_G01 | 20.51% | 20.51% |
| 01MAEC_G01 | 35.58% | 35.58% |
| 01MARSOL_G01 | 100.00% | 100.00% |
| 01PETSOL_G01 | 27.06% | 27.06% |



F. PERC95 RESULTS

| Resource Name | PERC95 Performance as of November 2022 | |
|---------------|----------------------------------------|------------|
| | Prelim FASR | Final FASR |
| 01PETSOL_G02 | 30.45% | 30.45% |
| 01RASLAG_G01 | 45.61% | 45.61% |
| 01RASLAG_G02 | 46.39% | 46.39% |
| 01SPABUL_G01 | 32.46% | 32.46% |
| 01SUBSOL_G01 | 26.98% | 19.54% |
| 01TERASU_G01 | 23.18% | 23.17% |
| 01YHGRN_G01 | 100.00% | 100.00% |
| 01ZAMSOL_G01 | 32.03% | 32.03% |
| 02ECOPRK_G01 | 30.29% | 30.29% |
| 02ECOTAGA_G01 | 33.89% | 33.89% |
| 02SMNRTH_G01 | 100.00% | 100.00% |
| 02VALSOL_G01 | 33.94% | 33.94% |
| 03ADISOL_G01 | 100.00% | 100.00% |
| 03CALSOL_G01 | 65.17% | 65.17% |
| 03SOLACE_G01 | 26.09% | 26.06% |
| 04PHSOL_G01 | 29.82% | 29.82% |
| 04SEPSOL_G01 | 21.93% | 21.91% |
| 05TOLSOL_G01 | 100.00% | 100.00% |
| 06CARSOL_G01 | 19.81% | 19.81% |
| 06HELIOS_G01 | 26.37% | 26.37% |
| 06MANSOL_G01 | 18.57% | 18.57% |
| 06MNTSOL_G01 | 21.91% | 21.91% |
| 06SACASL_G01 | 100.00% | 100.00% |
| 06SACASL_G02 | 100.00% | 100.00% |
| 06SACSUN_G01 | 30.46% | 18.99% |
| 06SLYSOL_G01 | 100.00% | 100.00% |
| 08COSMO_G01 | 100.00% | 100.00% |
| WIND | | |
| 01BURGOS_G01 | 27.63% | 27.59% |
| 01CAPRIS_G01 | 14.93% | 14.93% |
| 01NWIND_G01 | 19.74% | 19.74% |
| 01NWIND_G02 | 20.05% | 20.05% |
| 03AWOC_G01 | 21.73% | 21.73% |



F. PERC95 RESULTS

| Resource Name | PERC95 Performance as of November 2022 | |
|---------------|----------------------------------------|------------|
| | Prelim FASR | Final FASR |
| 08PWIND_G01 | 42.14% | 42.14% |
| 08SLWIND_G01 | 15.21% | 15.20% |

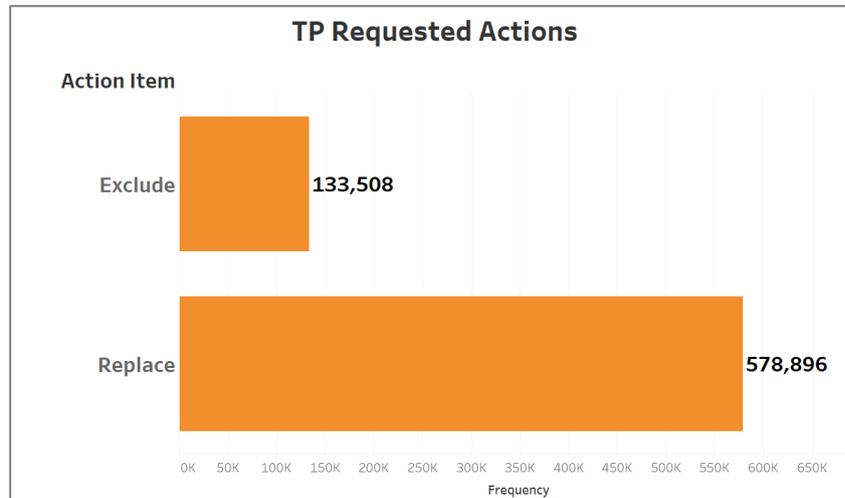
G. ECO GENERAL OBSERVATION

The following were observed and noted during the **January - November 2022** monitoring period and based on the computed FAS results:

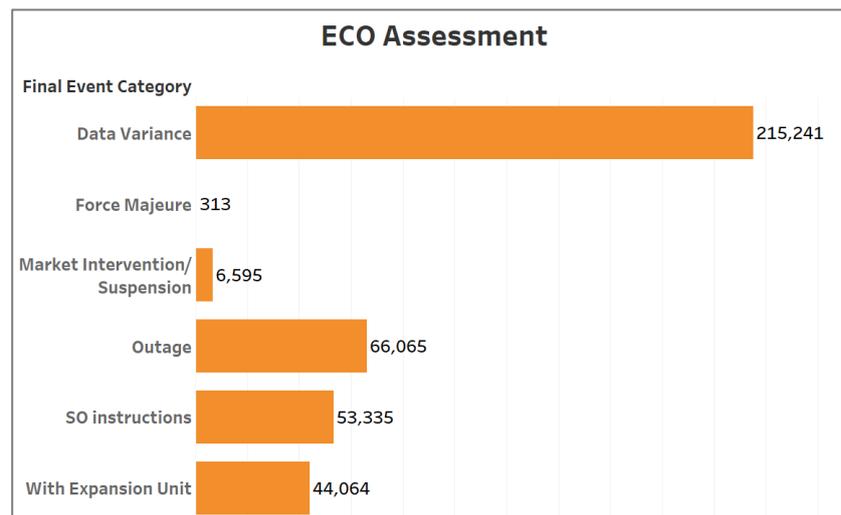
1. Since the start of the implementation of the FAS Manual 2.0, both ECO and the generator-MDGUs observed a number of issues and concerns in the monitoring of the FAS, particularly in the treatment or reference of the initial loading which is part of the calculation for the FPE which, in turn, affected the MAPE and PERC95 results. After due consultation and deliberation with IEMOP on the reference data to be used for calculation, ECO performed a recalculation of FAS results from the beginning of the covered monitored period (January 2022 – August 2022). This led to some adjustments on the FAS monitoring activities of ECO which includes the following:
 - a. Deferment of the publication of the Monthly Preliminary and Final FAS Results during the recalculation covering the billing period January to May 2022.
 - b. Conduct of several consultations and focus group discussions with the Department of Energy (DOE), Market Operator and the Trading Participants.
 - c. Filing of the Proposed Urgent Amendments to the WESM Manual “Procedures for the Monitoring of Forecast Accuracy Standards for Must Dispatch Generating Units” (WESM-FASMD) and the related provisions of the WESM Rules.
 - d. Implementation of the revised FAS Manual (FAS Manual 2.1) which became effective on 25 November 2022.
2. Out of the 73 facilities monitored, 35 facilities or 48% submitted justifications and supporting documents relative to the requested exclusion/s as mentioned in Section (C) (1.2) of this report. After consideration of the requests for recalculation, one (1) facility registered a declined MAPE and PERC95 ratings, and two (2) facilities had an improved rating in PERC95.
3. For this period, the recalculations were based on the requests: (a) For exclusions due to Outages, Market Suspension/Intervention, System Operator Instructions, Force Majeure; and (b) For replacement of data for specific dispatch intervals due to data variance. Such requests would have involved recalculation for 133,508 intervals (for exclusion) but only 126,309 or 94.6% of the intervals were considered by ECO; and only 215,241 out of 578,896 intervals or 37.2% was verified to be data variance that warranted recalculation. The ECO likewise applied the special condition applicable to MDGUs with expansion unit of 01SUBSOL_G01 in 44,064 intervals during the unit’s test and commissioning activity pursuant to Section 4.2.8 of the FAS Manual. The same was already reflected in the January – November 2022 FAS results.



G. ECO GENERAL OBSERVATION



Graph 11 – Summary of Requested Exclusions/Replacement of Data for Recalculation



Graph 12 – Summary of Accepted Exclusions/Replacement of Data Used in Recalculation

Furthermore, the request for exclusion by reason of outage is also assessed based on the actual occurrence of incident. The outage that is considered for purposes of recalculation as Exclusion (under Section 4.3.1 [d]) is any full or partial unavailability of *equipment or facility*, as defined in the WESM Rules⁶. It is, thus, distinguished from the resource constraints which refers to unavailability of the supply or source of energy. Resource constraint is not one of the Exclusions provided in the FAS Manual.

⁶ WESM Rules Glossary, Chapter 11



G. ECO GENERAL OBSERVATION

4. The non-submission of nominations resulted in 100% Forecast Percentage Error (FPE) in some dispatch intervals:

It must be noted that under Section 4.2.6 of the FAS Manual, the nomination of zero (0) MW in times of zero projection in the generation would carry some weight in the calculation of the FPE. Thus, for a solar plant which has expected zero generation during nighttime and nominates zero (0) MW would have less error than a solar plant which does not nominate at all.

5. A huge difference between the Metered Quantity and the Projected Quantity resulted in a high FPE in some dispatch intervals; MAPE and PERC95 are derived from the cumulative values of FPE.
6. One of the reasons being observed for having a huge difference between Metered Quantity and Projected Quantity is the infrequent revision of nomination of capacity. This means that there are plants which rarely revise their nominations even if the projected outputs previously nominated no longer represents the capacity or the projections in the relevant intervals.
7. For those intervals which have been recalculated due to the occurrences of some incidents that qualify as “exclusions,” within the meaning of Section 4.3 of the FAS Manual, it was observed that the resulting FPE varies depending on the plant’s performance with respect to the intervals that have not been covered by exclusions. The exclusions had either yielded a higher FPE for some plants and an improved FPE for others.
8. For those intervals which have been recalculated due to the occurrences of data error or non-updating/bad data in the NMMS that qualify as “data variance” and which allows replacement or substitution of corrected/validated data under Section 4.3.2 of the FAS Manual, it was observed that the resulting FPE varies depending on the plant’s performance using the correct data in place of the bad data.
9. The average MAPE of Solar, Wind and ROR plants as of November 2022 are 17.6%, 6.7% and 30.5%, respectively.
10. The average PERC95 of Solar, Wind and ROR plants as of November 2022 are 61.5%, 23.1% and 78.1%, respectively.
11. The ROR facilities performance in MAPE and PERC95 are both declining since January 2022.
12. Majority of the MDGUs with low passing rates are highly encouraged to comply with the PERC95 standards by revising and/or reflecting their most recent projections in their nominations via the market management system (MMS).
13. Pursuant to DOE Department Circular 2022-05-0015, ECO includes in its monitoring the MDGUs with FCATC which participated in the WESM (while awaiting the issuance of the COC from ERC) in terms of their compliance with the FAS Manual. It was observed that during the covered monitoring year, four (4) plants with issued FCATC effective in the last quarter of 2022 failed to meet the MAPE and PERC95 standards with results greater than 60% MAPE and 100% PERC95. Should these plants become unable to pass the annual results (January – December 2022), the concerned trading participants of the said MDGUs will be exempted from penalty/sanction, as it commences operation within three (3) months prior to the end of the covered monitoring year as provided in Sec 4.6.2 (b) of the FAS Manual Issue 2.1.



G. ECO GENERAL OBSERVATION

14. As mentioned in paragraph G.1 (a) of this Report, recalculations were made for the billing months January to August 2022 for all MDGUs to reflect the correct reference data consistent with the provisions of the FAS Manual 2.1, particularly on the use of the “initial loading” data. With notice to the DOE during the virtual meeting held on 12 September 2022, a deferment in the issuance of the FAS Report and the corresponding adjustment in the timeline was made during such recalculation activities, as summarized in the table below:

| Activities | Description | Target Timeline | Completed Date |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|
| a) Meeting with MDGUs | ECO organized a meeting with the MDGUs on the recalculation activity covering the 1 st half of 2022. Agenda: <ul style="list-style-type: none"> Recalculation (January - August 2022) TP and ECO activities timeline Open Forum Next steps | 27-Sep-2022 | 27-Sep-2022 |
| b) FAS Recalculation (January – August 2022) | ECO performed revalidation, reassessment and recalculation for the period covered January - August 2022 | 14-Oct-2022 | 04-Oct-2022 |
| c) Prelim FAS Results for January – August 2022 | Submission of AFASF and supporting documents from the Trading Participants for Billing Months starting January – August 2022 | 14-Nov-2022 | 14-Nov-2022 |
| d) Final FAS Results for January – August 2022 | Publication of Final FAS Results for January – August 2022 | 14-Dec-2022 | 16-Dec-2022 |
| e) [Additional Activity] WESM Compliance Bulletin 16.1 | Issuance/publication of the WESM Compliance Bulletin 16.1 (implementing FAS Manual 2.1) for the guidance of the concerned trading participant-MDGUs. | | 22-Dec-2022 |
| f) Prelim FAS Results for September – November 2022 | Publication of Prelim FAS Results for September – November 2022 | 26-Dec-2022 | 27-Dec-2022 |
| g) AFASF Submission (September – November 2022) | Submission of AFASF and supporting documents from the Trading Participants for Billing Months September - November 2022 | 15-Jan-2023 | 16-Jan-2023 |



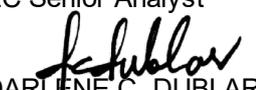
G. ECO GENERAL OBSERVATION

| Activities | Description | Target Timeline | Completed Date |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| h) [Additional Activity] FAS recalculation January – November 2022 | ECO performed further recalculation to observed frequent / additional data variance issues. | | 16-Feb-2023 |
| i) Final FAS Results for September - November 2022 | Publication of Final FAS Results for September - November 2022 | 04-Feb-2023 | 16-Feb-2023 |
| j) Prelim FAS Results for December 2022 | Submission of AFASF and supporting documents from the Trading Participants for Billing Month December 2022 | 09-Feb-2023 | 22-Feb-2023 |
| k) AFASF Submission (December 2022) | Submission of AFASF and supporting documents from the Trading Participants for December 2022 | 09-Mar-2023 | TBD (On track) |
| l) Annual Final FAS Report for 2022 | Publication of Annual Final FAS Report for 2022 and Issuance of the Notice of Specified Penalties to concerned trading participants-MDGUs | 31-Mar-2021 | TBD (On track) |

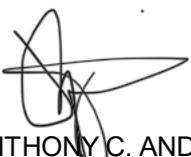
For the information of the DOE, the PEM Board, and the Compliance Committee pursuant to Section 4.4.5 of the FAS Manual.

Prepared By:


CARL ANGELO B. DELA CRUZ
EC Senior Analyst


DARLENE C. DUBLAR
EC Assistant Manager

Reviewed By:


MARK ANTHONY C. ANDRADA
Deputy Enforcement and
Compliance Officer

Approved By:


MA. HAZEL M. GUSATON-LOPEZ
Head, ECO,
22-Feb-2023