



PEM Audit Committee Report on the Market Readiness Assessment (MRA)

**For the implementation of enhanced WESM design and operations in
Luzon and Visayas, and WESM in Mindanao**

July 2019

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



EXECUTIVE SUMMARY

This report by the PEM Audit Committee (PAC) provides updates on the Market Readiness Assessment (MRA) activity as of 02 July 2019, including results of the Parallel Operations Program for the period 17 May 2019 to 20 June 2019. This augments the 1st MRA Report in May 2019.

The MRA activity is being conducted to ensure the effective transition to and implementation of the enhanced WESM design and operations in Luzon and Visayas, and WESM in Mindanao. It includes the conduct of a Parallel Operations Program (POP) by the Market Operator (MO), wherein the MO, System Operator (SO), PEMC, and Market Participants are able to try out for themselves the revised WESM processes, specifically the trading, dispatch, and settlement (i.e. bid to bill) processes with 5-minute dispatch intervals. During the initial month of POP, several operational issues were identified arising from the corresponding changes in market systems, processes, and paradigms.

As of 20 June 2019, system availability for new market systems have satisfied the targets while the completeness of market runs and timeliness of market publications for Day-Ahead Projections (DAP) and Hour-Ahead Projections (HAP) have been adversely impacted by performance tuning and functionality tests being performed in the POP environment by the MO. Accuracy of Visayas and Mindanao forecasts have failed to reach targets since week 6 due to the shift of data provided by the SO through a replicated database (eDNA). Meanwhile, there has been increasing participation in the submission of Generator offers and renewable energy resource nominations since the start of the POP.

The PEMC spearheaded the creation of the Market Readiness Steering Committee (MRSC), which is composed of the PEMC, MO, SO, and the Philippine Independent Power Producers Association (PIPPA) to address the Go-Live conditions and other POP concerns identified by Sapere. The MRSC Action Plans shall be considered in the Final Market Readiness Report for submission to the PEM Board, DOE, and ERC.

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INTRODUCTION

This report by the PEM Audit Committee (PAC) provides updates on the Market Readiness Assessment (MRA) activity from 26 May 2019 to 28 June 2019, including results of the Parallel Operations Program for the period 17 May 2019 to 20 June 2019.

This report augments the 1st MRA Report in May 2019, which identified matters for close monitoring to ensure the effective transition to the enhanced Wholesale Electricity Spot Market (WESM) design and operations in Luzon and Visayas, and WESM in Mindanao.

Background

As approved by the PEM Board, the Philippine Electricity Market Corporation (PEMC) engaged the Sapere Research Group Limited (Sapere) to conduct the MRA under the oversight of the PAC. The MRA activity is being conducted to assess the readiness of the PEMC, Market Operator (MO), System Operator (SO), Metering Services Providers (MSPs) and WESM participants, identify issues for resolution as well as to provide necessary recommendations to ensure the effective transition to and implementation of the enhanced WESM design and operations in Luzon and Visayas, and WESM in Mindanao.

The MRA includes the conduct of a Parallel Operations Program (POP) by the Independent Electricity Market Operator of the Philippines (IEMOP), under the supervision of Sapere. The POP aims to enable the MO, SO, PEMC, and Market Participants to try out for themselves the revised WESM operations, specifically the trading, dispatch, and settlement (i.e. bid to bill) systems and processes with 5-minute dispatch intervals.

The POP tests the operational functionality and interfaces of the new Market Management System (NMMS) and Central Registration and Settlement System (CRSS). That is, it assesses the reliability of the systems from the point of taking up participant bids, creation of dispatch instructions, the publication of prices, and preparation of settlements.

With the results of the POP and consultations with the concerned parties, the MRA also identifies issues arising from the corresponding changes in their systems, processes, and paradigms.

MRA TIMELINE AND ACTIVITIES

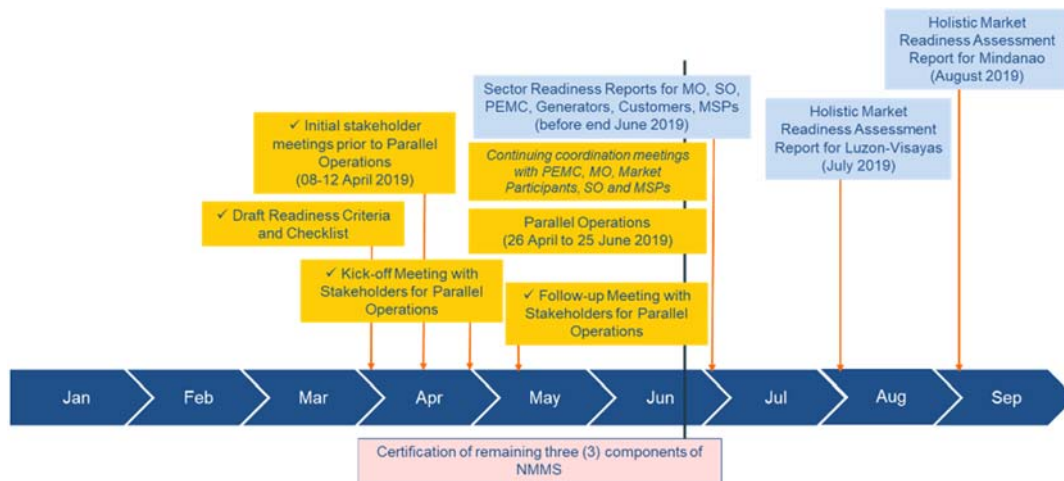
The POP was intended to be carried out over at least a two-month period, as follows:

- 26 April 2019 – 25 May 2019: Operations of the NMMS at the main site (Pasig City);
- 26 May 2019 – 25 June 2019: Operations of the NMMS at the back-up site (Cebu City), with fail-over exercise; and
- 26 June 2019 – 25 July 2019: Continuation of the POP subject to the results of the first two (2) months.

Due to operational concerns encountered in May 2019 (which are further discussed in the following section on the Status of Parallel Operations), the POP proceeded on the third month to consider the following activities:

- 26 April 2019 – 05 July 2019: Operations of the NMMS and CRSS at the main site (Pasig City);
- 05 July 2019 – 16 July 2019: Operations of the market systems at the back-up site (Cebu City), with fail-over exercise;
 - 05 July 2019: Switch-over of NMMS to back-up site;
 - 09 July 2019: Switch-over of CRSS to back-up site; and
- 16 July 2019 – 25 July 2019: Operations of the NMMS and CRSS at the main site (Pasig City).

As part of its deliverables, Sapere will submit its Holistic Market Readiness Report for Luzon and Visayas by end July 2019, and for Mindanao in August 2019, as shown in the timeline below.



To this end, the following activities were undertaken from 26 May 2019 to 28 June 2019:

1. Conduct of the parallel operations and monitoring of results
2. Conduct of stakeholder surveys
3. Participation in stakeholder meetings
4. Establishment of a Market Readiness Steering Committee and its Work Streams

Conduct of stakeholder surveys

Sapere conducted surveys with the Generators, Metering Services Providers (MSPs), and the SO to further assess their understanding of specific stakeholder issues. The result of the survey will form part of the Market Readiness Report of Sapere, response rates of the surveys to Generators and MSPs are as follows:

- Of the 99 generation companies provided with the survey and readiness criteria, 74 (75%) responded. Of the total, 26 generation companies were identified to have generation resources in Mindanao and 17 (65%) of those companies responded.
- Of the 48 MSPs, 24 (50%) responded. The MSPs provided with the survey includes the National Grid Corporation of the Philippines (NGCP), which is the sole WESM MSP, and the 47 retail MSPs.

Participation in stakeholder meetings

The PAC, through the PEMC, provided support to the DOE in their activities leading to the implementation of the enhanced WESM design and operations in Luzon and Visayas, and the WESM in Mindanao, and encouraging generator participants to actively participate in the POP. Updates on the MRA activity was presented by Sapere in the following fora:

Date	Venue	Stakeholders / Agenda
11 June 2019	Royal Mandaya Hotel, Davao City	• High-Level Meeting with Mindanao Generators on the Implementation of WESM
		• 17 th WESM Mindanao Readiness Technical Working Group (TWG) Meeting
17 June 2019	DOE, Taguig City	• Meeting with DOE and IEMOP on Readiness Issues and Action Plans

Establishment of a Market Readiness Steering Committee and its Work Streams

PEMC, as recommended by Sapere, spearheaded the establishment of a Market Readiness Steering Committee (MRSC) to resolve the critical issues identified by Sapere, as well as to ensure that all of the required Go-Live conditions for the 5-minute market are met through action plans and responsibilities are allocated for the delivery by each Work Stream.

On 26 June 2019, the MRSC held its first meeting and agreed on the following membership:

- Lead: Mr. Oscar Ala, PEMC President
- Members:
 - PEMC: Mr. Rauf Tan, Chief Governance Officer
 - IEMOP: Mr. Jose Bigornia, President
 - NGCP: Mr. Santiago Dimaliwat, Vice President of System Operations
 - Generator: Ms. Anne Macias, President and Executive Director of the Philippine Independent Power Producers Association (PIPPA)

- Work Stream Champions:

Work Streams	Organization
WS 1: MO System Readiness WS 1.1: NMMS Readiness WS 1.2: CRSS Readiness WS 1.3: MO Processes	IEMOP
WS 2: SO Readiness	NGCP
WS 3: MSP/Customer Readiness	PEMC
WS 4: Mindanao Participation	PEMC
WS 5: PDM approval	IEMOP & PEMC
WS 6: Co-optimization energy and reserves	PEMC
WS 7: Generator Readiness	PIPPA

While the PAC oversees the MRA activity, the activities of the MRSC to address issues arising from the MRA, including the POP, are independent from the PAC.

STATUS OF PARALLEL OPERATIONS

The Parallel Operations Program (POP) commenced on 26 April 2019, at 00:05 H, which covers the operation by the IEMOP of the following systems:

1. Current Systems for the operation of the current one (1) hour dispatch interval in accordance with the current Market Rules and Manuals
 - a. MMS by ABB
 - b. CRSS – for registration and declaration of bilateral contract quantity (BCQ)
 - c. Macro settlement spreadsheets – for metering and settlement
 - d. PEMC/IEMOP website
2. New Systems for the trial operation of the enhanced design and processes, i.e. 5-minute dispatch interval in accordance with the corresponding revised Market Rules and Manuals except for compliance to the must-offer rule (MOR) and 5-minute RTD schedules
 - a. NMMS by Siemens

- i. Production system – wherein Market Participants have access through the Market Participant Interface (MPI)
 - ii. Stand-alone offline system that has the same functionalities as the Production System. The MO shall use this system with the same inputs used in the current MMS. The results generated out of the processes from the two systems (NMMS vs. current MMS) shall be compared for evaluation required by the ERC for their review and approval of the proposed PDM.
- b. CRSS
 - c. IEMOP website

In supervising the POP, Sapere regularly interacts with the IEMOP, which submits daily and weekly POP Reports to Sapere. In turn, Sapere submits and presents to the PAC their Weekly Progress Report by email and teleconference. As of this writing, Sapere submitted five (5) weekly reports since 25 May 2019, as follows:

Date	Covered Period ¹	Parallel Operations Highlights
29 May 2019 <i>(submitted while waiting on IEMOP's Week 4 POP Report)</i>	Week 4: 17 May – 23 May 2019	<ul style="list-style-type: none"> Level of Generator participation in Mindanao has improved, while participation in Luzon and Visayas are above 80% NMMS not producing implementable 5-minute dispatch schedules. SO has not yet commenced their assessment of the impact of 5-minute schedules on system security SO not ready for 5-minute dispatch under co-optimisation Standalone NMMS system continues to be not operational Waiting on data for system performance and system accuracy No incident reports received
06 June 2019	Week 5: 24 May – 30 May 2019	<ul style="list-style-type: none"> Timelines in providing Sapere with weekly and daily POP reports has improved Level of Generator participation in Mindanao remains poor with occasional signs of improvement, while participation in Luzon and Visayas are above 80% 100% system availability

¹ Weeks 1 to 3 are covered under the 1st MRA Report

Date	Covered Period ¹	Parallel Operations Highlights
		<ul style="list-style-type: none"> Processing of schedules has improved but, to a lesser extent, some erratic performance issues continue to be encountered With the exception of DAP, high timeliness of publication DAP forecast accuracy affected by the reliability of real time system demand data being provided by the VSO through a replicated database (eDNA) Standalone NMMS system continues to be not operational until 29 May 2019
13 June 2019	Week 6: 31 May – 06 June 2019	<ul style="list-style-type: none"> Participation in Mindanao remains low Continuing high level of system availability Resolving and stabilizing the settlement system prior to the June 2019 settlement run on 26 June 2019 is now on the critical path for POP SO for Luzon, Visayas, and Mindanao confirmed the need of one month of observations to conduct RTD security analysis Prices from the standalone NMMS environment is fully reflective (uses 100%) of actual generator offers into the live market and uses true SCADA system snapshots Forecasting accuracy for both Visayas and Mindanao has been impacted by the shift to eDNA replication as the primary connection to IEMOP for real-time SCADA feeds from the SO
20 June 2019	Week 7: 07 June – 13 June 2019	<ul style="list-style-type: none"> Participation in Mindanao remains low 100% availability for the 3rd week in a row Resolving and stabilizing the settlement system prior to the June 2019 settlement run on 26 June 2019 remains on the critical path for POP Interfacing between IEMOP and the new SO SCADA primary connections has now been largely resolved but there remain some minor reliability issues with the quality of the data in VSO and MSO Price differences from the standalone NMMS and current MMS reflect greater automation in the NMMS processes, use of 5 minute SCADA snapshots and market behaviours Forecasting accuracy for both Visayas and Mindanao remains impacted by the shift to eDNA replication

Date	Covered Period ¹	Parallel Operations Highlights
02 July 2019	Week 8: 14 June – 20 June 2019	<ul style="list-style-type: none"> • Participation in Mindanao remains low • 100% availability for the 4th week in a row • Performance of market runs have been impacted by performance tuning and functionality tests being performed in the POP environment by the MO • Forecasting accuracy for both Visayas and Mindanao remains impacted by the shift to eDNA replication

In accordance with the revised MRA requirements, Sapere was on-site from 25 May 2019 to July 2019 to closely monitor the POP. Per their workplan, Sapere will be remotely monitoring the POP and reporting to the PAC by teleconference starting on 04 July 2019.

Operational Results (26 April 2019 to 20 June 2019)

Similar with the Market Operator Performance Standards (MOPS), system performance and regional forecast are monitored and assessed during the POP. In reference to the Weekly Reports of Sapere in the above section, the operational results of the POP are provided in Table 1.

Table 1. Operational POP Results (26 April 2019 to 20 June 2019)

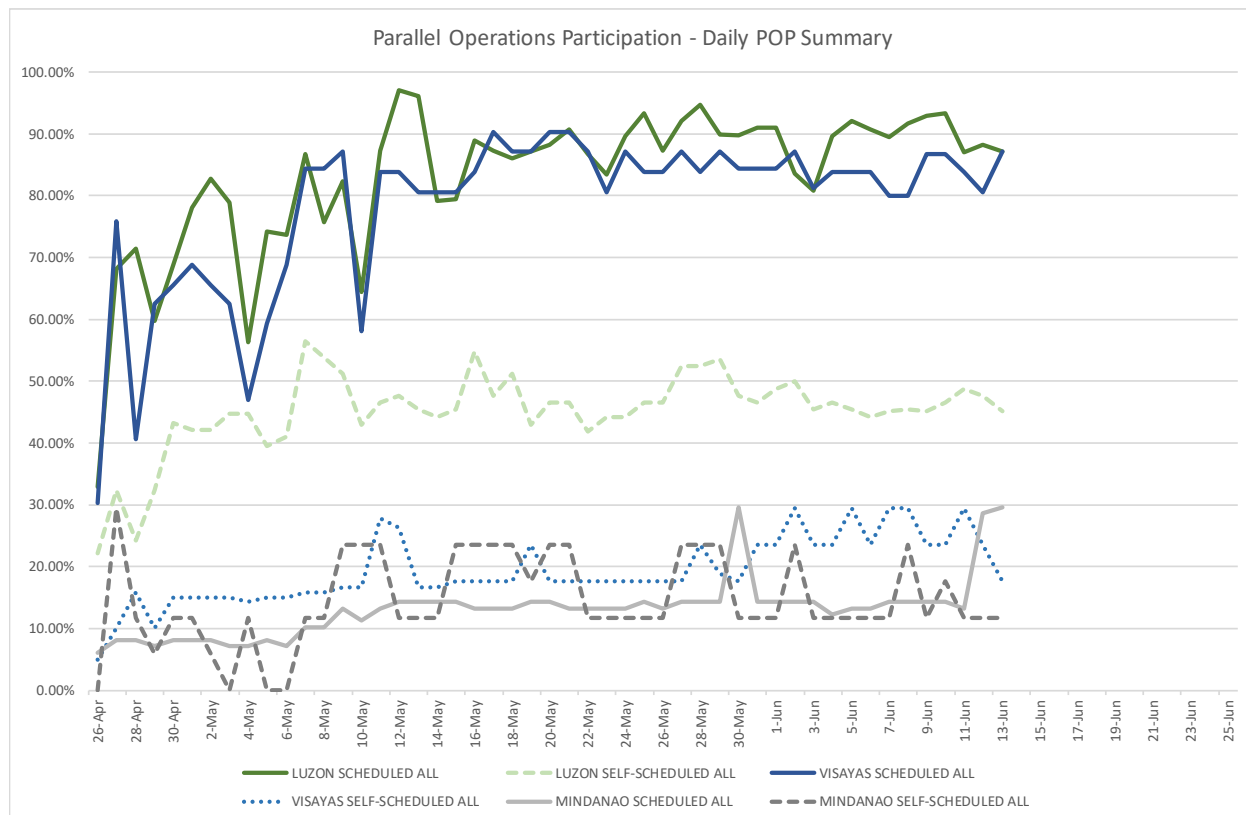
Criteria ²	Target	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
System Availability									
MPI Availability	99.90%	100%	99.70%	100%	100%	100%	100%	100%	100%
CRSS System Availability	99.90%	95.33%	100%	97.70%	92.36%	100%	100%	100%	100%
EMDRP Availability	99.90%	100%	100%	100%	100%	100%	100%	100%	100%
IEMOP Website Availability	99.50%	100%	100%	100%	100%	100%	100%	100%	100%
Completeness of Market Runs									
Real-Time Dispatch (RTD)	95.00%	99.70%	100%	96.78%	91.72%	91.67%	98.36%	98.36%	99.85%
Hour-Ahead Projections (HAP)	95.00%	96.63%	100%	67.81%	7.54%	97.02%	97.27%	97.32%	94.35%
Day-Ahead Projections (DAP)	95.00%	88.10%	99.40%	66.67%	36.31%	98.81%	98.81%	99.40%	68.45%
Week-Ahead Projections (WAP)	95.00%	100%	100%	71.43%	42.86%	100%	100%	100%	100%
Dispatch Interval Pricing Calculation (DIPC)	95.00%	99.70%	100%	99.80%	100%	100%	100%	100%	100%
Timeliness of Market Run Publication									
RTD Publication	95.00%	100%	100%	99.95%	99.90%	99.90%	100%	100%	99.90%
Hour-Ahead Projections (HAP)	95.00%	100%	100%	100%	100%	100%	100%	100%	99.60%
Day-Ahead Projections (DAP)	95.00%	93.92%	83.20%	67.26%	71.7%	77.0%	62.5%	62.5%	54.30%
Week-Ahead Projections (WAP)	95.00%	100%	100%	100%	50.00%	100%	100%	100%	100%
RTD mean absolute percentage error (MAPE)									
Luzon	0.95%	1.13%	0.96%	0.79%	0.61%	0.69%	0.64%	0.61%	0.61%
Visayas	1.20%	1.53%	2.77%	1.65%	1.71%	1.44%	1.37%	1.24%	1.24%
Mindanao	1.20%	1.31%	1.79%	1.10%	1.10%	1.02%	1.51%	1.42%	1.42%
RTD forecast accuracy rating (FAR)									
Luzon	97.20%	96.04%	94.56%	98.03%	99.91%	98.71%	99.21%	99.76%	99.76%
Visayas	93.00%	89.59%	90.13%	84.66%	86.00%	89.51%	90.43%	92.70%	92.70%
Mindanao	93.00%	94.24%	92.11%	94.51%	96.09%	94.93%	87.80%	87.29%	87.29%

Source: Sapere Weekly Reports are the primary source of data

² Note: For simplicity, the ratings are coded either as meeting target (green) or below target (red).

Market Participation

There has been increasing participation in the submission of Generator offers and renewable energy resource nominations since the start of the POP, as provided below:



The chart does not reflect, however, whether non-participation is because of a reluctance to participate or there are other issues preventing participation. The chart also only measures uploading of offers by generation unit. It does not measure whether participants are downloading RTD schedules to assess the outputs from NMMS themselves and it doesn't reflect the portion of capacity in each part of the market covered by participating market participants.

Matters for further Monitoring

Sapere identified critical conditions which should be resolved or addressed prior Go-Live of the enhanced WESM design and operations in Luzon and Visayas, and WESM in Mindanao. These are the following:

1. MO system stability and reliability – The MO systems should demonstrate a sustained period of stability and reliability, including a successful proof of disaster recovery (DR) provisions.
2. Audit certification of core NMMS systems and validation of enhancements to NMMS and CRSS – Completion of the NMMS audit and confirmation that the audit certification of core NMMS systems remains valid following the subsequent production system changes made by IEMOP (e.g. patches and bug fixes). In its absence, a supplemental audit is conducted, and systems are re-certified.
3. Market participation connectivity and access to data - Market Participant concerns on connectivity and access to data should be addressed through a combination of remedial actions prior to market go-live, and clear post market launch enhancement plans.
4. Forecast accuracy - Improvements to the forecast accuracy of the NMMS to meet MRA criteria/targets, which closely follows targets under the Market Operator Performance Standards (MOPS).
5. SO Security assessment - Confirmation of system security by the SO (in Luzon, Visayas, and Mindanao) following detailed assessment of RTD, HAP, and WAP.
6. Clarity on arrangements for procurement of, and deployment of, all three forms of reserve i.e. decision on the treatment of co-optimization - A policy decision on whether co-optimization will be included into the 'day-1' WESM enhanced market.
7. PDM Approval - Approval of the Price Determination Methodology (PDM)

8. Regulatory certainty over the treatment of meter data where MSP can only provide 15-minute data – MSPs are able to submit 5-minute meter data or the MO able to receive 15-minute meter data and convert as a transitional measure.
9. The pathway for introducing WESM in Mindanao - A policy decision on how to proceed with the low levels of Mindanao participation levels and WESM registration.

At this point, the MRSC, has set out to address the above-mentioned Go-Live conditions and other POP concerns identified by Sapere. Updates of the MRSC Action Plans shall be considered in the Final Market Readiness Report for submission to the PEM Board, DOE, and ERC.