



Report on 7th Market Operations Audit

26 June 2016 to 25 December 2019

AUGUST 2021

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

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EXECUTIVE SUMMARY

This report provides the objectives, scope and results of the 7th Market Operations Audit (7th MO Audit) covering the period 26 June 2016 to 25 December 2019. The Philippine Electricity Market Corporation (PEMC) has engaged RSM Australia Pty Ltd with the support from Market Reform, TechSafe Australia and Reyes Tacandong & Co., hereto collectively referred as the Auditor, to conduct the 7th MO Audit, which covers the specified Wholesale Electricity Spot Market (WESM) and Retail Contestability and Open Access (RCOA) activities of PEMC and of the Independent Electricity Market Operator of the Philippines (IEMOP), as required by the WESM and Retail Rules and Manuals.

The audit aims to reinforce Trading Participants' confidence in the transparency and adequacy of the operations of the WESM through testing procedures focused on compliance with the relevant Market Rules and Manuals and software and systems review, related to the specified areas. The detailed testing procedures covered the following areas:

- Area 1 - Market Operations Audit
 - Task 1.1 – Market Software and Systems Review
 - Task 1.2 – Process and Compliance Review
 - Task 1.3 – Bid to Bill Analysis
- Area 2 - Market Monitoring and Assessment and Compliance Monitoring Review
 - Task 3.1 – Procedure/Process and Compliance Review of the PEMC
 - Task 3.2 – Software Certification Audit of PEMC systems intended for enhanced WESM design
- Area 3 - Market Maturity Assessment
 - Task 4 – Review of Market Maturity

Upon the conclusion of the audit, the Auditor identified seven (7) findings and four (4) opportunity for improvement classified according to a defined risk rating, herein summarized below:

Scope Area	H 1	H 2	H 3	M 1	M 2	L 1	O 3
Task 1.1: Market Software and Systems Review	-	-	-	-	-	-	-
Task 1.2: Process and Compliance Review	2	-	-	1	1	1	2
Task 1.3: Bid-to-Bill Analysis	-	-	-	-	-	-	-
Task 3.1: Procedure/Process and Compliance Review of the PEMC	-	1	-	-	1	-	1
Task 3.2: Software Certification Audit of PEMC systems intended for enhanced WESM design	-	-	-	-	-	-	1

Scope Area	H	1	H	2	H	3	M	1	M	2	L	1	O	3
Task 4: Review of Market Maturity	Not applicable													

The Auditor also issued software certificates for the New Market Assessment System (NMAS) and Compliance Post-Evaluation and Monitoring System (CPEMS) indicating its compliance to applicable Market Rules and Manuals, relevant ERC issuances, and software specification.

On the Market Maturity Assessment, the Auditor observed that the Market Operator's environment and processes were assessed in the *Developing* phase.

The Auditor also followed-up on actions taken by PEMC/IEMOP on findings/recommendations from the 6th Market Operations Audit. The Auditor identified four (4) issues which actions taken by the MO are currently ongoing, thus, considered as partially resolved. Meanwhile, four (4) issues have not been resolved therefore, remain outstanding for the period of 26 June 2016 to 25 December 2019.

1.0 ABOUT THIS REPORT

This report is being prepared pursuant to Section 3.7.2 of the PEM Audit Manual. It contains the objectives, scope and audit approach for the conduct of the 7th Market Operations Audit as well as the significant findings and recommendations identified in the course of the audit.

2.0 BACKGROUND

The PEM Audit Committee (PAC) is mandated under the WESM Rules to conduct, coordinate and supervise the audit of the systems and operations of the spot market and of the Market Operator (MO), on its own or through appointment of an external auditor. The purpose for the conduct of said audit is to reinforce the WESM Members' confidence in the transparency and adequacy of the operation of Wholesale Electricity Spot Market (WESM).

In line with this mandate, the PAC administers independent operational audits of the systems and procedures on market operations through an External Auditor, with an end view of having a reliable third-party opinion on the integrity, accuracy, and adequacy of WESM operations, procedures, results and reports.

For the period in review, 26 June 2016 to 25 December 2019, PEMC has engaged RSM Australia Pty Ltd (RSM) with support from Market Reform, TechSafe Australia and Reyes Tacandong & Co. as the 7th Market Operations Auditor in relation to the specified WESM and RCOA activities of PEMC and IEMOP, as required under the WESM and Retail Rules and Market Manuals.

The PEMC and IEMOP served as auditees prior and after transition to independent market operations, respectively. The conduct of the audit officially started in August 2020 and was concluded in July 2021.

3.0 AUDIT OBJECTIVES

The audit aims to reinforce Trading Participants' confidence in the transparency and adequacy of the operation of the WESM, through the PEM Board, which established the PAC under the WESM Rules. Meanwhile, under the Retail Rules, the PAC is mandated to conduct the audit of the Central Registration Body (CRB) and the systems, processes and procedures and other matters relevant to its operations and the performance of its functions as set forth in the Retail Rules and test and evaluate enhancements or new versions of market-related software used or provided by for use by WESM members.

The objectives of the independent audit are to:

- Review and assess adequacy of the procedures and working processes of the MO/CRB;
- Review and assess the usefulness and appropriateness of settlement systems and data management used by the MO/CRB to administer the WESM/RCOA;
- Review and assess the compliance of the MO/CRB with the WESM Rules, Retail Rules and Market Manuals;

- Review and assess the appropriateness of actions taken by the MO to address previous audit findings;
- Review and assess MO's performance in line with standards established by the DOE and recommend improvements in the said standards; and
- Identify room for improvement in the current systems and processes with the view to enhance the competitive level of the WESM and the RCOA.

4.0 AUDIT SCOPE

The following audit areas were established in the Terms of Reference (TOR) duly approved by the PEM Board, as follows:

Area 1 – Market Operations Audit

Task 1.1 – Market Software and Systems Review

This task will cover the review of the systems, tools and programs changed or introduced during the audit period. The following systems which have changed or been implemented during the period were reviewed:

- Metering Daily RCOA Validation Program;
- Negative Loss in MA Patch Fix;
- MQ Integrator 5 to 15 min interval;
- Enhancement of MRU Tool;
- Changes to PSM Application due Scheduling of Reserves in WESM; and
- Update Existing Additional Compensation Tool.

Task 1.2 – Process and Compliance Review

Task 1.2.1 Current Market Design

This task includes the following:

- Review the MO's compliance with its obligations in the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC and existing Internal Business Procedure (IBP);
- Review consistency of MO's current IBP with the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC.

Task 1.2.2 Enhanced WESM Design

This task includes review of the consistency of MO's IBPs with the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC amended for the Enhanced WESM Design and Operations.

Task 1.3 – Bid-to-Bill Analysis

This task includes the conduct of chronological testing of the market processes from the trading participants' registration, submission of offers up to invoicing and payment by the MO.

This task shall likewise include other relevant MO activities that are covered by the specific requirements under the WESM Rules, Manuals and other relevant Protocols, such as participant suspension and de-registration, market suspension, intervention, pricing error and price substitution methodology (PSM) for congestion.

Area 2 – Market Monitoring and Assessment and Compliance Monitoring Review

Task 3.1 – Procedures/Process and Compliance Review

- Review PEMC's working processes and procedures for the market monitoring and assessment, for both current and enhanced WESM design, to ensure consistency with the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC;
- Validate the Market Operator Performance Standards (MOPS) Report approved during the audit period;

Task 3.2 – Software Certification Audit of PEMC systems intended for the enhanced WESM design

- Market Assessment System (MAS). MAS is an in-house developed system being used by the PEMC-Market Assessment Group for the collection, validation and processing of market monitoring data, and calculation of monitoring indices.
- Compliance Post Evaluation Monitoring Systems (CPEMS). CPEMS is intended to complement the New Management Market System – Compliance Monitoring Module (NMMS-CMON), which flags concerned Trading Participants' probable breach of the Dispatch Conformance Standards (DCS) and Offered Capacity Compliance Standards (OCCS), in accordance with the WESM Rules and relevant WESM Manuals. The CPEMS shall provide a tool wherein the concerned Trading Participants will be able to seamlessly submit reasons and supporting documents for the flagged probable breach by the NMMS-CMON. This system is also projected to be used for assessing the said probable breach by taking into consideration all the relevant market data from other related systems.

Area 3 – Market Maturity Assessment

Task 4 – Review of Market Maturity

The Auditor shall provide a holistic review of market for the covered period and provide assessment of the market operations maturity, in reference to applicable maturity assessment model/s.

The market operations and transactions, for the period 26 June 2016 to 25 December 2019 were within scope of the testing procedures, which further included the transfer of all market operations functions, assets and liabilities from PEMC to IEMOP on 26 September 2018. In order to review compliance with the WESM Rules, Retail Rules, Market Manuals and IBPs, the parties that were subject to the testing procedures included:

- PEMC as the MO/CRB for WESM operations and RCOA for the period 26 June 2016 to 25 September 2018;

- IEMOP as the MO/CRB for WESM operations and RCOA for the period 26 September 2018 to 25 December 2019; and
- PEMC for market monitoring and assessment, compliance monitoring and Market Operator performance monitoring.

5.0 AUDIT METHODOLOGY

The Auditor employed a compliance and risk assessment framework to organize all the findings in the study to be applied for the 7th MO Audit. The framework used in categorizing each finding or observation involved the determination of a risk rating and a compliance rating. The approach for risk ratings and compliance ratings enabled the prioritization of actions and efforts to remediate identified issue.

The risk ratings assigned were based on the methodology which considered the likelihood of occurrence and its consequence and, each finding/observation was provided with a corresponding compliance rating.













The Auditor also reviewed PEMC/IEMOP's systems, processes, and procedures against a set of benchmark criteria and industry best practice. The criteria upon which the review will be conducted are set out in Appendix A.



6.0 AUDIT FINDINGS AND FOLLOW-UP OF PRIOR AUDIT ISSUES

The Auditor has identified seven (7) findings and four (4) opportunity for improvement over the period of the review, with risk and compliance ratings as follows:

Scope Area	H 1	H 2	H 3	M 1	M 2	L 1	O 3
Task 1.1: Market Software and Systems Review	-	-	-	-	-	-	-
Task 1.2: Process and Compliance Review	2	-	-	1	1	1	2
Task 1.3: Bid-to-Bill Analysis	-	-	-	-	-	-	-
Task 3.1: Procedure/Process and Compliance Review of the PEMC	-	1	-	-	1	-	1
Task 3.2: Software Certification Audit of PEMC systems intended for enhanced WESM design	-	-	-	-	-	-	1
Task 4: Review of Market Maturity	Not applicable						

The findings are detailed below.





Item No.	Finding/Issue	Market Operator	Risk	Compliance
Task 1.2 - Process and Compliance Review				
1	Suspension Notice not issued for WESM Members The Auditor reviewed a sample of thirty-three WESM Members during the period (26 June 2016 to 25 December 2019) and noted three instances where a suspension notice was not issued when a WESM Member failed to provide a replacement security within the required timeframe as per Clause 3.15.5 of the WESM Rules. A suspension notice is required to be issued under Clause 3.15.7 of the WESM Rules.	PEMC & IEMOP		
2	Transfer of the Market Operator Function Change Management Process Throughout the delivery of testing procedures, the Auditor encountered difficulty in retrieving supporting documentation from the period where PEMC fulfilled the role of Market Operator, 26 June 2016 to 25 September 2018. This potentially indicates deficiencies in the change management process that was undertaken during the transitional period to IEMOP.	PEMC & IEMOP		
3	Completion of Adjusted Settlement Statements in a Timely Manner The Auditor reviewed a sample of six adjusted Settlement Statements and data which occurred during the period 26 June 2016 to 25 December 2019. The evidence provided confirmed the process was performed, however this evidence was insufficient to determine whether the adjusted Settlement Statement was completed within the required timelines of Clause 3.14.9.1 and Clause 3.14.9.2 of the WESM Rules.	PEMC		
4	Unable to Confirm Verification of Settlement Data for Final Adjusted Statements The Auditor selected a sample of six adjusted settlement data and associated statements for testing. PEMC was not able to provide evidence to verify the adjusted settlement data was assessed and approved by the Settlement Specialist. This is a requirement under Trading Operations Department IBP.	PEMC		
5	Timeliness in notifying WESM Members of Cessation Requirements The Auditor tested a sample of six cessations over the period in review and noted four instances where the “notification of cessation” to WESM Members was not completed in a timely manner as required by the WESM Manual.	PEMC & IEMOP		
Task 3.1(a) - Procedure/Process and Compliance Review of the PEMC				
6	Unable to Verify the Training and Development program provided to the Market Assessment Group (MAG) In accordance with ISO 19600:2014 - Compliance Management Systems, the Auditor noted PEMC were unable to provide evidence of	PEMC		

Item No.	Finding/Issue	Market Operator	Risk	Compliance
	technical training programs or training registers to demonstrate that the MAG personnel received technical training during the period.			
7	MOPS Source Data Recalculation does not Reconcile to MOPS Masterfile The MOPS Annual Report is a public report which contains a number of metrics used to determine the performance of the MO each year. The Auditor performed a recalculation of the values reported in both 2018 (PEMC) and 2019 (IEMOP) MOPS Annual Report in order to reconcile the source data from the MOPS Masterfile to the MOPS Annual Reports. The Auditor noted 5 instances (3 PEMC and 2 IEMOP) where source data did not reconcile to that in the MOPS Annual Reports.	PEMC		

The Auditor also issued software certificates for the New Market Assessment System (NMAS) and Compliance Post-Evaluation and Monitoring System (CPEMS) indicating its compliance to applicable Market Rules and Manuals, relevant ERC issuances, and software specification (refer to Appendix B).

As for the Market Maturity Assessment, based on the testing performed, the Auditor observed that the MO's environment and processes were assessed in the *Developing* phase. The Auditor has provided recommendations for the management to consider in their decision making related to the implementation of process improvements. These recommendations should enhance internal controls and should result in MO's control environment position moving towards the 'Established' phase.

The Auditor also followed-up on actions taken by PEMC/IEMOP on findings/recommendations from the 6th Market Operations Audit. The Auditor identified four (4) issues which actions taken by the MO are currently ongoing, thus, considered as partially resolved. Meanwhile, four (4) issues have not been resolved therefore, remain outstanding for the period of 26 June 2016 to 25 December 2019. These issues are summarized below.

Item No.	Finding/Issue	Year Raised	Status
6th Market Audit Task 3b – Process and Compliance Review			
1	Quality of RE nominations poor and causing CVs to occur	2015	
2	Coordination of MO Market Network Model (MNM) & Timing of SO Commissioning of New Transmission Elements	2015	
3	Lack of critical information on power system from distribution utility networks for representation in MNM	2015	
4	Snapshot files triggering CVs due to errors in the snapshot files	2015	

6th Market Audit Task 4 – Outstanding Prior Issues			
5	MOPS Report Validation	2015	O
6	MOPS – Lack of security over the input templates in the MOPS Masterfile	2015	O
7	WESM members trading while suspended	2015	O
8	Structure of Market Fee Components as required by WESM Rules	2015	O

7.0 ENDORSEMENT

This report summarizes the results of the recently concluded 7th MO Audit for the period 26 June 2016 to 25 December 2019 conducted by the Auditor, RSM Australia Pty Ltd with support from Market Reform, TechSafe Australia and Reyes Tacandong & Co.

The Auditees, in its response to the findings of the Auditor, committed to address the audit findings as part of its continuous efforts to improve its procedures, processes and systems to effectively administer the WESM operations. The PAC will monitor the compliance to the Action Plans, through an assessment of the development and implementation of the audit recommendations, as provided under the PEM Audit Manual,

After assessment and deliberation, the PAC during its meeting on 14 July 2021, fully accepted the findings and the recommendations of the Auditor, RSM Australia Pty Ltd, as provided in the Final Audit Report. The PAC herein submits this report to the PEM Board.



Felixberto U Bustos, Jr.
Chairperson



Eduardo Alejandro O. Santos
Member



Christian M. Orias
Member

8.0 APPENDICES

APPENDIX A RISK AND COMPLIANCE RATINGS

The risk and compliance ratings applied to assess the issues identified are as follows:

Compliance Rating

Rating		Description
Level 1	1	Evidence of non-compliance with testing criteria. These should be addressed as a matter of high priority.
Level 2	2	Issues which could possibly result in non-compliance with audit criteria, but where no evidence of actual non-compliance was found. However, there is considered to be insufficient formal evidence of controls in place or being actioned in relation to these issues. These should generally be addressed within one to two months.
Level 3	3	Housekeeping matters and opportunities for improving internal controls and procedures relating to electricity market operations. These should be addressed within 3-6 months.






Risk Ratings

The Auditor applied PEMC's Enterprise Risk Management Framework in assessing the risk associated with

		SEVERITY OF IMPACT				
		Insignificant	Minor	Moderate	Major	Catastrophic
PROBABILITY OF OCCURRENCE	Certain	Low	Medium	High	Extreme	Extreme
	Likely	Low	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	Medium
	Improbably	Low	Low	Low	Low	Low

issues identified during the audit. The risk ratings applied are consistent with the probability of occurrence and severity of impact matrix presented in PEMC's Risk Assessment and Prioritization Procedure:

The ratings have been tailored to reflect the impact on the WESM as follows:

Rating		Description
Extreme		Issues which may have a catastrophic impact on WESM and/or RCOA operations if they are not addressed immediately and require executive action with regular reporting at Board level.
High		Issues which may have a major impact on WESM and/or RCOA operations if they are not addressed as a matter of priority. These issues require senior management attention with regular monitoring and reporting at executive and Board meetings.
Medium		Issues which may have a moderate impact on WESM and/or RCOA operations if they are not addressed within a reasonable timeframe. These issues require management attention with regular ongoing monitoring.
Low		Issues which may have a minor impact on WESM and/or RCOA operations if they are not addressed in the future. These issues are the responsibility of management with regular monitoring and reporting at staff meetings.
Efficiency/ Opportunity		Housekeeping matters and opportunities for improving internal controls and procedures and efficiency relating to WESM and RCOA operations.

The table below refers to the likelihood classification guidelines:

Likelihood	Annual Probability	Frequency of Event	Qualitative Description
Certain	> 70%	3 in 4-year event	Will occur in most circumstances; statistical record of several occurrences
Likely	41% to 70%	1 in 2-year event	Can be expected to occur in most circumstances; statistical record of some occurrence.
Possible	21% to 40%	1 in 3-year event	May occur but not expected in most circumstances; statistical record of at least one occurrence.
Unlikely	1% to 20%	1 in 10-year event	Conceivable but unlikely to occur in any given year; no history of occurrence.
Improbably	< 1%	1 in 100-year event	Will only occur in exceptional circumstances; no history of occurrence.

The table below refers to the consequence classification guidelines:

Severity of Impact/ Consequence	Financial Impact	Reputational Impact	Security Impact	Safety Impact	Infrastructure and Environment
Catastrophic	Very Significant; 2.5% of participant/ Sector turnover	Significant long-term damage to stakeholder confidence; high loss of	Will result in violation of power system security standards or other technical standards. Security of confidential	Fatality or permanent injury or widespread impact on public safety.	Permanent long-term affect or irreversible damage caused.

Severity of Impact/ Consequence	Financial Impact	Reputational Impact	Security Impact	Safety Impact	Infrastructure and Environment
		public confidence.	information & systems at high risk.		
Major	Significant; 1% of participant/ sector turnover	Significant short-term damage to stakeholder confidence; some loss of public confidence	Could result in violation of power system security / technical standards; Security of confidential information & systems at risk.	Serious injury requiring hospitalisation > 5 days or localised impact on public safety	Significant affect, difficult to reverse the impact
Moderate	0.1% of participant/ Sector turnover	Some damage to stakeholder confidence	Under some situations could result in violation of power system security / technical standards. Security of systems / information could be jeopardised in some cases.	Injury requiring < 5 days of hospitalisation or medical treatment	Measurable effect, easily reversible
Minor	Small	Manageable reduction in stakeholder confidence	Unlikely to lead to violation of power system security / technical standards. Unlikely to jeopardise the security of information/systems.	Medical treatment only	Measurable effect, no reverse actions required
Insignificant	Very small	No lasting effects	Does not lead to violation power system security or technical standards; will not result in leakage of confidential information.	First aid	No measurable affect

The status of issues raised in prior periods are assigned one of the following:

Status of Implementation		
Resolved	R	All agreed actions have been implemented successfully.
Partially Resolved	P	Some agreed actions have been implemented.
Outstanding	O	Agreed actions have yet to be implemented.

APPENDIX B SOFTWARE CERTIFICATES



INDEPENDENT CERTIFICATION REPORTS

7th Market Operations Audit, Market Monitoring and Assessment and Compliance Monitoring Review and Market Maturity Assessment

Certification of CPEMS Software

Certification of NMAS Software

INDEPENDENT CERTIFICATION – COMPLIANCE POST-EVALUATION MONITORING SYSTEM (CPEMS)

Board of Directors of the Philippine Electricity Market Corporation (“PEMC”)

Introduction

RSM has been engaged by the Philippines Electricity Market Corporation (“PEMC”) to certify the compliance of the within scope CPEMS software to be used for market monitoring and assessment by PEMC relative to the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC (referred to here as the “governing documents”).

Scope

As the CPEMS is new the relevant scope was to conduct a software certification audit of these systems for the enhanced WESM Design.

The CPEMS assists management and processing of non-compliance with respect to various standards.

Methodology

As the system is not operational our methodology was limited to reviewing testing performed by PEMC and conducting our own tests based on data and results extracted from these systems. As business and solution requirement documents provided more detail than the governing documents the primary focus of our reviews and testing were the business and solution requirements.

Reviews and tests were developed to verify core functionality and where possible to verify the successful execution of end-to-end processes. Our testing comprised:

- Review of PEMC internal testing
- Software testing, including testing of functionality at each stage or processing as well as testing performance of end-to-end processes.

Testing was performed by querying the supplied data. Tests were designed to find issues or irregularities in the performance of the software.

Findings

The CPEMS system was found to perform as expected within the limits of our certification.

Several minor documentation issues were identified in business and solution requirements documents that were used as a reference point for testing.

Limitation of Certification

All reviews and testing were conducted remotely and we did not have access to the actual systems or source data. This required our testing to be based on data extracted from those systems. This created a number of significant constraints on testing:

- We could not verify the correct operation of processes to draw in data from other external systems;
- We could not directly test interfaces, though could trace sequences of process steps through data;
- In some instances data tables and fields in the actual systems were not replicated in the data we were provided. This meant that data required by some scripts was missing meaning those scripts could not be meaningfully run; and
- In some cases only a subset of data – such as data for one day – was available for analysis owing to the volume of the data.

INDEPENDENT CERTIFICATION – COMPLIANCE POST-EVALUATION MONITORING SYSTEM (CPEMS) (CONT.)

Limitation of Certification (Cont.)

While every effort was made to test a representative range of features this was not always possible given the data limitations. As such our findings are based on the tests we could run. No responsibility can be accepted for any current issues with the within scope features of these systems which we were unable to test.

No method of certification can provide an absolute guarantee that the software is error free or in compliance.

Certification of the CPEMS Software

The following is our certification of the extent to which the within scope features of the CPEMS functionality complies with the governing documents.

Although we have observed and reported some issues, we note that these systems do not set market results and provided that the software is used in the manner intended and is provided with correct input data we certify that the CPEMS software to be used by PEMC will perform substantially in compliance with governing documents.

This certification relates solely to the calculations that are performed within the CPEMS software and makes no comment on the general suitability of the programs in performing the required tasks. It covers only the automated processes within the programs and assumes that all associated manual tasks are performed as required and without error.

Signed:



J ELKHISHIN
Joint Engagement Partner
RSM Australia Pty Ltd

Brisbane
11 August 2021



T PITTAWAY
Lead Engagement Partner
RSM Australia Pty Ltd

Sydney
11 August 2021

INDEPENDENT CERTIFICATION – NEW MARKET ASSESSMENT SYSTEM (NMAS)

Board of Directors of the Philippine Electricity Market Corporation (“PEMC”)

Introduction

RSM has been engaged by the Philippines Electricity Market Corporation (“PEMC”) to certify the compliance of the within scope NMAS software to be used for market monitoring and assessment by PEMC relative to the WESM Rules, Retail Rules, Market Manuals, relevant Circulars, Orders and other Issuances of the DOE and ERC (referred to here as the “governing documents”).

Scope

As the NMAS is new the relevant scope was to conduct a software certification audit of these systems for the enhanced WESM Design.

NMAS is used by the PEMC Market Assessment Group which performs data collection, processing and validation, real-time market monitoring, and post market analysis. NMAS comprises three modules: Module 1 relates to data collection, processing and validation; Module 2 performs real-time market monitoring; and Module 3 performs post market analysis.

Methodology

As the system is not operational, our methodology was limited to reviewing testing performed by PEMC and conducting our own tests based on data and results extracted from these systems. As business and solution requirement documents provided more detail than the governing documents the primary focus of our reviews and testing were the business and solution requirements.

Reviews and tests were developed to verify core functionality and where possible to verify the successful execution of end-to-end processes. Our testing comprised:

- Review of PEMC internal testing; and
- Software testing, including testing of functionality at each stage or processing as well as testing performance of end-to-end processes.

Testing was conducted for each of the three modules in NMAS separately.

Testing was performed by querying the supplied data. For Modules 1 and 3 data the vast amount of data available meant that it was only practical to work with a single day of data. Testing of Modules 1 and 3 focused on verifying existence of required data elements, successful operation of stored procedures, and consistency of results with expectations. Testing of Module 2 focused on the correct implementation of various triggers and flags.

Tests were designed to find issues or irregularities in the performance of the software.

Findings

The NMAS system was found to perform as expected within the limitation of our certification though we found that

- The archiving function associated with data collection and processing has not yet been implemented;
- One query was yet to be implemented in the post market analysis process;
- Several minor functional issues were also identified but these have since been addressed; and
- Minor documentation issues related to CRSS data storage were identified in business and solution requirements documents that were used as a reference point for testing.

INDEPENDENT CERTIFICATION – NEW MARKET ASSESSMENT SYSTEM (NMAS) (CONT.)

Limitation of Certification

All reviews and testing were conducted remotely and we did not have access to the actual systems or source data. This required our testing to be based on data extracted from those systems. This created a number of significant constraints on testing:

- We could not verify the correct operation of processes to draw in data from other external systems;
- We could not directly test interfaces, though could trace sequences of process steps through data;
- In some instances data tables and fields in the actual systems were not replicated in the data we were provided. This meant that data required by some scripts was missing meaning those scripts could not be meaningfully run; and
- In some cases only a subset of data – such as data for one day – was available for analysis owing to the volume of the data.

While every effort was made to test a representative range of features this was not always possible given the data limitations. As such our findings are based on the tests we could run. No responsibility can be accepted for any current issues with the within scope features of these systems which we were unable to test.

No method of certification can provide an absolute guarantee that the software is error free or in compliance.

Certification of the NMAS Software

The following is our certification of the extent to which the within scope features of the NMAS functionality complies with the governing documents.

Although we have observed and reported some issues, we note that these systems do not set market results and provided that the software is used in the manner intended and is provided with correct input data we certify that the NMAS software to be used by PEMC will perform substantially in compliance with governing documents.

This certification relates solely to the calculations and process steps that are performed within the NMAS software and makes no comment on the general suitability of the programs in performing the required tasks. It covers only the automated processes within the programs and assumes that all associated manual tasks are performed as required and without error.

Signed:



J ELKHISHIN
Joint Engagement Partner
RSM Australia Pty Ltd

Brisbane
11 August 2021



T PITTAWAY
Lead Engagement Partner
RSM Australia Pty Ltd

Sydney
11 August 2021