



# **Report on the Audit of the Market Operator's Additional Compensation Tool for Must Run Unit Reconciled Intervals**

---

**Tool to support the calculation of additional compensation  
for Trading Participants that were designated as Must Run Units**

**APRIL 2022**

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

# Contents

FOREWORD.....	2
1.0 ABOUT THIS REPORT.....	3
2.0 EXECUTIVE SUMMARY .....	3
2.1 BACKGROUND .....	3
2.2 AUDIT SCOPE AND OBJECTIVES .....	4
2.3 AUDIT METHODOLOGY .....	4
2.4 AUDIT FINDINGS AND CONCLUSION.....	6
2.4.1 SOFTWARE CERTIFICATION .....	6
2.4.2 ICT CHANGE MANAGEMENT REVIEW .....	6
2.4.3 OPPORTUNITY FOR IMPROVEMENT .....	8
3.0 APPENDIX A SOFTWARE CERTIFICATE.....	9

## FOREWORD

The PEM Audit Committee (PAC) supervised the independent software certification audit of the Additional Compensation Tool for Must Run Unit for Reconciled Intervals (MRU Tool) used by the Market Operator, Independent Electricity Market Operator of the Philippines (IEMOP), for the calculation of additional compensation of generators which were reclassified from “Not MRU” to “MRU”.

The audit was conducted to assess the tool’s compliance with the Market Rules and Manuals, relevant ERC issuances, and tool specifications. The audit also determined whether the development to deployment of the software enhancements followed the ICT Change Management process and secured appropriate approvals.

The Philippine Electricity Market Corporation (PEMC) has engaged Reyes Tacandong & Co. to conduct the software certification audit under PAC’s supervision. After the conclusion of the audit, Reyes Tacandong & Co. submitted a report indicating assessment details as follows:

- Software Certification Audit – compliant in all areas audited; and
- Change Management Review – not compliant in most control areas. Control gaps were identified in relation to the review of ICT Change Management process, the details of which are provided in Section 2.4.2.

Accordingly, Reyes Tacandong & Co. issued software certificate confirming that the MRU Tool is consistent with requirements with respect to Market Rules and Manuals, relevant ERC issuances, and tool specifications.

The PAC wished to express its appreciation and gratitude to the management of PEMC as well as the Auditee, IEMOP, for the cooperation and support they extended to the Auditor for the successful completion of this audit project.

For the PEM Audit Committee,



**ATTY. MAILA LOURDES G. DE CASTRO**  
Chairperson



**FRANCISCO LEODEGARIO R. CASTRO, JR.**  
Member



**ROSSANO C. LUGA**  
Member

## 1.0 ABOUT THIS REPORT

This report is 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 MRU Tool Audit as well as the findings and recommendations identified in the course of the audit.

## 2.0 EXECUTIVE SUMMARY

### 2.1 BACKGROUND

The Independent Electricity Market Operator of the Philippines (IEMOP), as the Market Operator, calculates the payments to be made to each designated Must Run Unit (MRU) that complied with the dispatch instructions. The payment is calculated by multiplying the applicable Generation Price Index (GPI) with the energy quantities for the relevant trading hour at which that MRU was designated as such<sup>1</sup>. The applicable GPI for a given billing period is calculated using data from the immediately preceding billing period<sup>2</sup>. The billing period is defined in the WESM Rules.

A Trading Participant which has complied with dispatch instructions as MRU may be entitled to additional compensation. Additional compensation is allowed in cases where the Trading Participant submits sufficient proof that the MRU settlement amount calculated in accordance with WESM Rules and Market Manual is not sufficient to cover the following costs that were incurred in complying with the MRU call:

- Fuel costs; and,
- Variable operating and maintenance costs, which may include start-up cost and shut-down costs<sup>3</sup>.

Thru its letter dated 21 April 2021, IEMOP informed the PAC that the development and testing of the Additional Compensation Tool for MRU Reconciled Intervals (Request for Change (RFC) No. RFC-2003-003) has been completed on 31 March 2021. The macro tool will support the calculation of the additional compensation of generators that were reclassified from “Not MRU” to “MRU”.

Upon request of the PAC, IEMOP presented the said RFC during the PAC Meeting No. 21-05 on 12 May 2021 and highlighted the need to deploy the enhanced software prior the commercial launch of the enhanced WESM design and operations (EWDO) on 26 June 2021 since the said tool will be implemented for the one-hour market.

Based on the result of IEMOP’s risk assessment showing a significant financial impact, the PAC initially considered to audit the MRU Tool prior to its deployment and commercial use. However, on 31 May 2021, the PAC decided to post-audit the tool given the scant remaining time before the target commercial launch of EWDO on 26 June 2021.

---

<sup>1</sup> Management of Must-Run and Must-Stop Units Issue 8.0 Section 9.3 (Manual for one-hour market)

<sup>2</sup> Management of Must-Run and Must-Stop Units Issue 8.0 Section 9.1 (Manual for one-hour market)

<sup>3</sup> Management of Must-Run and Must-Stop Units Issue 8.0 Section 9.3.2 (Manual for one-hour market)

On its letter 01 June 2021, the PAC informed IEMOP that it may proceed with the deployment of the MRU Tool considering that the development and testing had undergone IEMOP's ICT Change Management process, subject to prior notice to all WESM Members and the PEM Board<sup>4</sup>. Accordingly, IEMOP notified the PEM Board (thru a letter) and all WESM Members (thru email advisory) of the enhancements on the MRU Tool on 04 June 2021 and 09 June 2021, respectively, prior to its commercial deployment on 15 June 2021 .

On 29 September 2021, the PEM Board approved the engagement of third-party auditor for the audit of MRU Tool and the results of the competitive bidding. Thereafter, PEMC engaged Reyes Tacandong & Co. to conduct the software certification of the MRU Tool. The kickoff meeting for the audit project was conducted on 12 October 2021 and the closing meeting was held on 09 March 2022 which marked the conclusion of the audit project.

## 2.2 AUDIT SCOPE AND OBJECTIVES

The audit was conducted to assess the MRU Tool's compliance with the Market Rules and Manuals, relevant ERC issuances, and tool specification. Specific recommendations were provided as to how the identified inconsistencies and non-compliances could be corrected.

The audit also determined whether the development to deployment of the software enhancements followed the ICT Change Management process and secured appropriate approvals. The relevant controls (or lack thereof) were identified and the effectiveness of identified controls to prevent, detect and/or correct errors that the enhancements may bring about were verified.

## 2.3 AUDIT METHODOLOGY

The overall audit approach on the software audit followed these stages:

1. Planning and Inception Reporting
2. Audit Execution and Confirmation
3. Submission of Preliminary Report
4. Revalidation
5. Final Reporting

A two-phase review was conducted for the software certification audit. The first phase focused on the assessment of the software system if it is operating in accordance with the design. Available documentation of the requirements and functions were used to assess the validity of the system implementation. This approach focused on the following criteria:

Software Certification Audit Criteria	
SC1	Functional requirements and design documents were complete.
SC2	The design for the role that the software was intended to perform is compliant with the relevant Market Rules and Manuals.

<sup>4</sup> PEM Audit Manual, Section 10

Software Certification Audit Criteria	
SC3	The input data were accurate, complete, and authorized.
SC4	The data retrieval was accurate (e.g., where data interfaces are configured).
SC5	The data is processed as intended within an acceptable period.
SC6	The system computations were accurate.
SC7	The output or reports are complete and accurate.
SC8	A record is maintained to track the process of data from input to storage and to the output.
SC9	Notifications are set up to bring issues to the attention of the user.

The second phase focused on the review of the processes on how the software is used. For instance, if the software highlights a potential behavioural issue in the market, it was ascertained whether there were processes in place to ensure that the appropriate actions will be made (e.g., approved and documented process manual).

The adequacy of change management procedures was also evaluated to ensure that only valid and approved changes are being migrated into the production. This approach focused on the following criteria:

Change Management Audit Criteria	
CM1	The change management process is defined and communicated to those involved in the process, including employees and service providers.
CM2	The standard methodology was used during the performance of changes to the systems.
CM3	The standard change request form was accomplished.
CM4	All changes, including changes to programs, configurations, settings, were documented, reviewed, and approved by appropriate personnel.
CM5	All changes were tested prior to migration to the production environment.
CM6	Test procedures and results were adequately documented.
CM7	Migration of changes were approved by appropriate personnel.
CM8	Only authorized personnel have access to migrate changes to the production environment.
CM9	End-user acceptance tests were conducted and adequately documented.

## 2.4 AUDIT FINDINGS AND CONCLUSION

### 2.4.1 SOFTWARE CERTIFICATION

The MRU Tool is compliant in all areas audited.

**Limitation on the Software Certification Assessment.** *The Auditor highlighted that their assessment is only limited to the processing and output check functionality of the tool and does not cover the validity of the input data. The input data were generated from other systems not covered in the audit scope. The Auditee represented that all the input data used in the processing of MRU are reviewed by other departments. No further validation check is performed by the process owner using the tool. Thus, the Auditor cannot form a conclusion on the ability of the process to achieve finality with respect to the validity of the input data.*

### 2.4.2 ICT CHANGE MANAGEMENT REVIEW

The following control gaps were identified during the review of the ICT Change Management:

- **Control Change.** Control change logs in the MRU tool were not formally established. (Refer to Key Finding CM-3)
- **Control Change & Implement Change.** Secure segregation of duties between the developers and migrators of changes to production. (Refer to Key Finding CM-1)

The detailed observations and recommendations for the Key Findings are presented below

Key Finding	Risk Rating	Observation	Recommendation
CM 1 - Secure segregation of duties between the developers and migrators of changes to production		<p>IT personnel involved in the development and migration of Additional Compensation tool (i.e., Software Design Specialists) have access to both development and production environment.</p> <p>Taking into consideration existing controls that IEMOP has represented to be in place (i.e., review and approval of user as part of the Work Plan Completion Report and Release Notes), the risk that the developer may bypass the version control remains. This could potential be realized in the following scenario:</p> <ul style="list-style-type: none"> <li>• Conditions: (a) there are no audit logs of changes to the version deployed on the users' machines. and (b) no review is performed on the change logs;</li> </ul>	<p>IEMOP should consider revisiting the purpose of access of the identified Software Design Specialist and assess if this is necessary.</p> <p>Scenario A If unnecessary, remove the access right.</p> <p>Scenario B If necessary, perform the following at a minimum:</p> <ol style="list-style-type: none"> <li>1. Log and monitor the user activities of those with role and access as Developer and Migrator of the Macro tool.</li> </ol>

Key Finding	Risk Rating	Observation	Recommendation
		<ul style="list-style-type: none"> <li>Potential Impact: The Work Plan Completion Report and Release Note may indicate that the appropriate change has been made but other changes during the installation in the users' machines may have been undocumented. These changes may be through error or deliberate act.</li> </ul> <p>Criteria ISO 27002 6.1.2 Segregation of duties Conflicting duties and areas of responsibility should be segregated to reduce opportunities for unauthorized or unintentional modification or misuse of the organization's assets.</p>	<p>2. Perform a periodic review of the change/version logs generated by the Macro tool.</p>
<p>CM 3 - Establish formal control change logs in MRU Tool</p>		<p>Change record tracking document are manually recorded. In addition, the MRU Tool did not have automated and unmodifiable change logs. No version control history was maintained as well.</p> <p>Considered together with the issue on non-segregation of development and migration duties, there is no control that could help detect whether changes to the MRU Tool were all appropriate and authorized.</p> <p>Criteria IT Change Management Procedure All IT system change should be recorded in the change record tracking document.</p> <p>COBIT - BAI06.03 Track and report change status. Maintain a tracking and reporting system to document rejected changes, communicate the status of approved and in-process changes, and complete changes. Make certain that approved changes are implemented as planned</p>	<p>IEMOP should consider investing in XLTools Version Control, an add-on in macro tools that can automatically monitor and track changes and would enable the Company to:</p> <ol style="list-style-type: none"> <li>Track changes made to a VBA project and commit versions;</li> <li>Review change log and see who modified the code and when;</li> <li>Recover and roll back to any previous version;</li> <li>Compare VBA module versions side by side and highlight changes; and</li> <li>Store revision history in a Git repository.</li> </ol>

### **2.4.3 OPPORTUNITY FOR IMPROVEMENT**

This observation is considered as housekeeping matters and opportunity for improving internal controls and procedures related to MRU Tool operations. This is an item that is not risk-rated as it is not considered as control gap for the purpose of this audit but is reported for the PAC and IEMOP's consideration for the improvement in the change process documentation.

The Auditor recommended to consider developing a flowchart presenting the step-by-step change management process in the ICT Change Management Procedures. This would aid those who may need to undertake the change process (i.e., change requestors, change implementors, and system owners) to better understand the control requirements for change management and dependencies in the different sub-processes, especially when they would request a change.

### **3.0 APPENDIX A SOFTWARE CERTIFICATE**



## PRIVATE AND CONFIDENTIAL

March 8, 2022

### **ATTY. MAILA LOURDES G. DE CASTRO**

Chairperson, PEM Audit Committee  
Philippine Electricity Market Corporation  
18th Floor, Robinsons Equitable Tower  
ADB Avenue, Ortigas Center  
1600 Pasig City, Philippines

**Dear Atty. De Castro,**

## SCOPE OF THIS CERTIFICATE

The purpose of this software certification is to confirm that **Additional Compensation Tool for Must Run Unit (MRU) Reconciled Intervals (“MRU Tool”)** is consistent with requirements of Market Rules and Manuals, and relevant ERC issuances, and specifications of the Tool.

The audit areas tested are as follows:

- a) **Normal MRU Process** – Controls over running the regular MRU process if the claimant filed for an additional compensation.
- b) **MRU Reconciled Tagging** – Controls over running the process to accommodate participants that were not included in the normal MRU processing.
- c) **Computation of Security Limited – MRU Specific to PSALM (Malaya Plant)** – Controls over processing settlement for PSALM. In the normal MRU process the settlement type of PSALM is “general”. Therefore, payment will not be credited to the plant. In this process, settlement type will be changed to “security limited” to correct the payment.

## CERTIFICATION TESTING METHODOLOGY

The general approach we adopted for testing the audit areas were:

- Obtained an understanding of the WESM Rules and confirming the business processes, system, and data flows pertinent to MRU Tool process through walkthrough meetings.

- Reviewed related business requirements documentation and identified key system functionalities including the embedded application controls that ensured the integrity of the system records.
- Reviewed the production master records to identify invalid data format, blank fields, duplicate values, limit check, and drop-down list, among others.
- Developed test cases to assess the various aspects of the MRU Tool process, as indicated in the Scope of this Certificate.
- Ran test cases to evaluate system functionality.

## **CERTIFICATION OF THE MRU TOOL COMPONENT WITH RESPECT TO REFERENCE DOCUMENTATION**

This is to certify that the **MRU Tool** is consistent with the following compliance requirements:

### **a. WESM Rules – Wholesale Electricity Spot Market Rules**

- 3.13 Settlement Quantities and Amount
  - 3.13.14 Settlement Amounts for Trading Participants
- 3.14 Settlement Process
- 6.6 System Security
  - 6.6.1 System Security and Reliability Guidelines

### **b. WESM Manual - Management of Must-Run and Must-Stop Units Issue 8.0**

- 6.0 Must Run Unit Criteria
- 7.0 Considerations and Criteria for Selection of Must Run Units
- 9.0 Settlement of Must Run Units
  - 9.1 Calculation of Generation Price Index
  - 9.2 Verification of MRU Data
  - 9.3 Calculation of MRU Settlement Amounts
  - 9.4 Allocation of MRU Settlement Amounts to Customer

### **c. Business Requirement Document – Additional Compensation Tool for MRU**

- 2.1 Compute MRU AddComp – Normal
- 2.2 Reconciled Tagging for MRU
- 2.3 Security Limited

***Limitation on the Software Certification Assessment.*** We highlight that our assessment was limited to the processing and output check functionality of the tool and does not cover the validity of the data inside the input folders. Data in these folders were generated from other systems not covered in the audit scope and were manually transferred into said folder.

Management has represented that all the input data used in the processing of MRU were reviewed by other departments. No further validation check was performed by the process owner using the tool. Thus, we cannot form a conclusion on the ability of the process to achieve finality with respect to the validity of the input data from the relevant folders.

Very truly yours,



**Caesar Parlade**  
Managing Partner, Advisory Division

For and on behalf of Reyes Tacandong & Co.