



Energy Efficient Water Sector (EEWS)

Organizational Development to Support Anchoring of Energy Management System in the Jordanian Water Sector

EnMS Internal Audit Report for the year 2023 Miyahuna Water Company (MWC)

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List of Abbreviations

MWC	Miyahuna Water Company
EnMS	Energy Management System
R&R	Roles and Responsibilities
EnPI	Energy Performance Indicator

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1. Summary

As part of the implementation cycle of the Energy Management System (EnMS) in the Jordanian Water Sector, a full cycle of the EnMS internal audit was conducted in November 2023. The objectives of the audit included the following:

1. Check compliance with ISO 50001:2018 standard requirements and assess the readiness of the EnMS for certification.
2. Assess the maturity of the EnMS implementation.
3. Identify improvement areas covering different aspects of the EnMS

The audit Scope conducted in Miyahuna Water Company included 25 facilities in different locations within the company's operation areas, where the results of the maturity of EnMS implementation varied between those facilities. The overall result of the company's score was (76%).

This report presents the results of the EnMS internal audit, both on the company level and the facility level. It also shows the maturity of EnMS core (Central) elements compared to the target level and highlights the non-conformities and improvement opportunities.

2. Internal Audit Scope and Methodology

This internal audit cycle included the facilities:

1. Zai - IPS
2. Zai-PS1
3. Zai-PS2
4. Zai-PS3
5. Zai-PS4
6. Zai-WT
7. Zai-PS5
8. New Zarqa PS
9. Um-Rummaneh WTP
10. kharabsheh PS
11. Wadi Al seer PS
12. Taj PS
13. Dabouq Booster
14. Zara Main PS 1
15. Zara Main PS 2
16. Zara Main PS 3
17. Zara Main PS 4
18. Zara Main PS 5
19. Zara Main PS 6 /Muntazah
20. Ain Ghazal PS
21. Al Damkhi PS
22. Wadi Al Seer Spring
23. Al Yasmeen PS
24. Al-Azraq PS
25. Khaw PS

During the audit, the audit team collected the objective evidences needed to support the audit findings through the following techniques:

1. Interviews with energy unit staff and other relevant department's representatives.
2. Visits to facilities included in the EnMS scope.
3. Review of supporting documents which requested before, through and after the audit.

The internal audit was conducted by qualified internal audit team, which included the following team members:

1. Eng. Ahmad Al-Hinti (INMA consulting)
2. Eng. Sohayb Abedalraheem (INMA consulting)
3. Eng. Anas Al-Momani (WAJ- Energy Unit)

4. Eng. Mohamad Al-Hroob (WAJ- Energy Unit)
5. Eng. Heba Abu-Taha (WAJ- Organization Development Directorate)

The following standards/tools were used as the audit reference:

1. ISO 50001 standard requirements.
2. ISO 50005 guidelines.
3. Jordanian Water Sector EnMS Toolbox.

3. Evaluation Tool

To make the results of the internal audit understandable and to highlight areas for improvement to the different stakeholders, such as top management and energy team, an evaluation tool that quantifies the results has been developed (***please refer to the internal audit concept for more details***).

The evaluation tool has been designed to accommodate the particularity of the EnMS is being implemented in the Jordanian Water Sector. The Evaluation tool covers different dimensions, such as:

1. EnMS implementation maturity levels according to the ISO 50005 guidelines (Phased implementation of energy management systems). (Refer to Annex # 1 of this report – Internal audit checklist).
2. Entire company and individual scope facilities results.
3. EnMS core and noncore elements, with focus on core elements.

Maturity Level:

The following chart shows the score that will be given to each task based on the achieved maturity level. The score varies between (0.25) for level (1) and (1.00) for level (4).

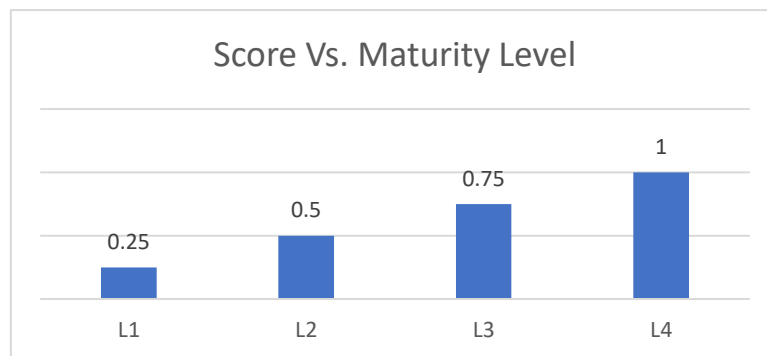


Chart (1): Maturity levels

Company/Facility Level:

Out of (35) EnMS tasks defined in the R&R sheet, (24) are assessed on the company level. On the other hand, (11) are assessed on the facility level, where the average of all facilities score against a specific task, represents the company score for that task.

Core/Noncore Elements:

The evaluation tool defined six core elements that represents the major activities of the EnMS, these elements are:

1. Target/ Action Plans/ EnPI
2. Energy Review
3. Energy Efficient Operations
4. Energy Efficient Design
5. Energy Efficient Procurement
6. Monitoring and Evaluation

The following charts show the total weights of core and non-core elements, both on the company and facility levels. Core elements represent (60%) of the total weight on the company level, where it represents (75%) on the facility level.

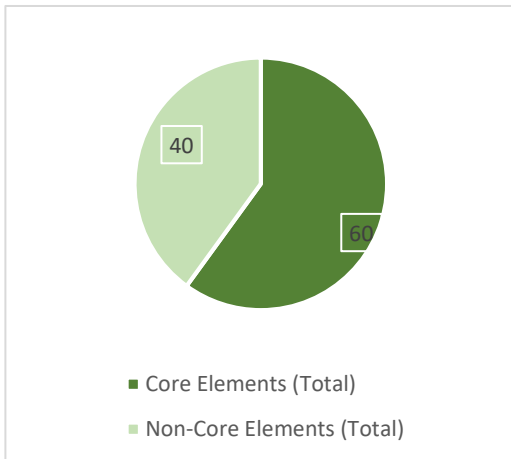


Chart (2): Elements weights on the company level

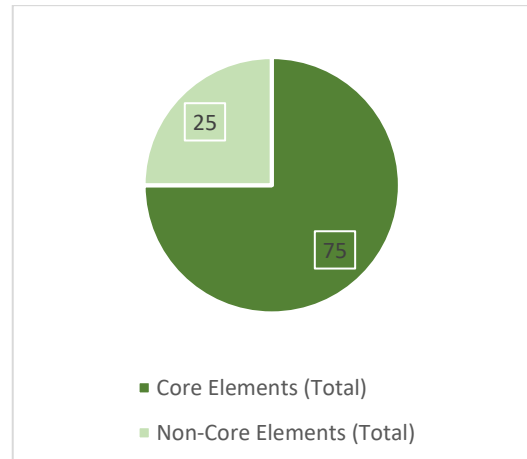


Chart (3): Elements weights on the facility level

4. Internal Audit checklist

The internal audit checklist, which had been shared with the company energy unit team prior to the audit, provides the requirements that needs to be met for each maturity level per task.

For more details about the requirements and how each task is assessed by the audit team, please refer to the checklist in Annex (1).



5. Internal Audit Results

Based on the interviews conducted and the objective evidences collected during the internal audit, each task of the EnMS was assessed against the maturity levels and given a score accordingly. Annex #2 represents the detailed score of each task both on the company and facility levels.

Taking into consideration that the EnMS is in place for about two years. The target result is to achieve level (3) which is equivalent to (75%) in the evaluation tool. The overall result achieved was (76%), compared to (61%) in 2022. On the other hand, the facilities' results varied between (79%) such as Zai and Zara stations, and (55%) in Wadi Al Seer Spring.

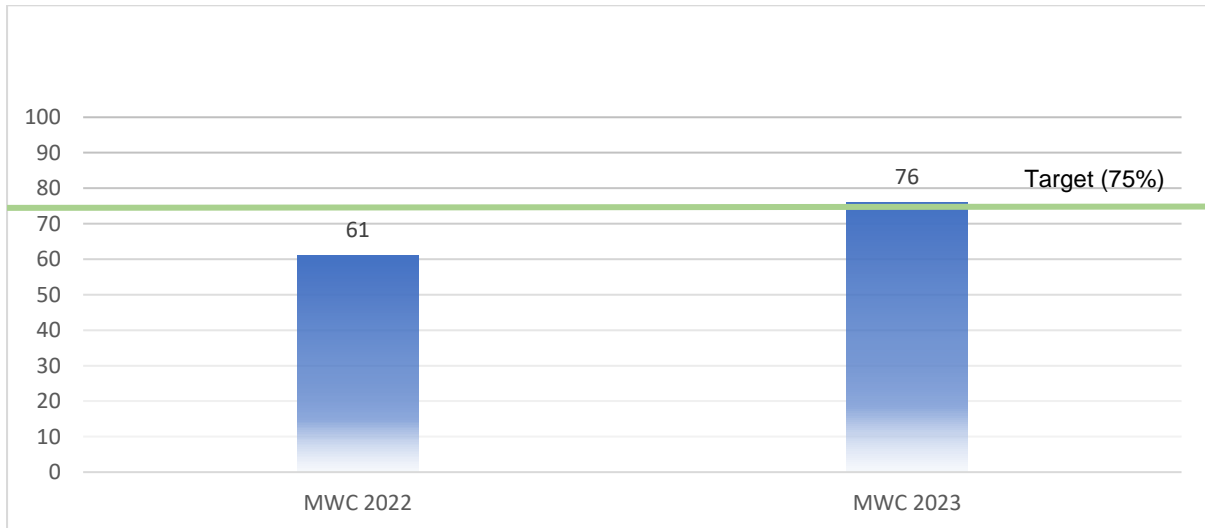


Chart (4): Comparison with last year's result

The detailed score for 2023 is as follows:

Table (1): EnMS Internal audit detailed score – Company level

EnMS element	Score	Maximum Score
Target/ Action Plans/ EnPI	12%	12%
Energy Review	9%	12%
Energy Efficient Operations	10%	12%
Energy Efficient Design	3%	6%
Energy Efficient Procurement	3%	6%
Monitoring and Evaluation	9%	12%
Non-Core Elements	30%	40%
Total Score	76%	100%

The following chart represents the overall results both on the company level and per facility.

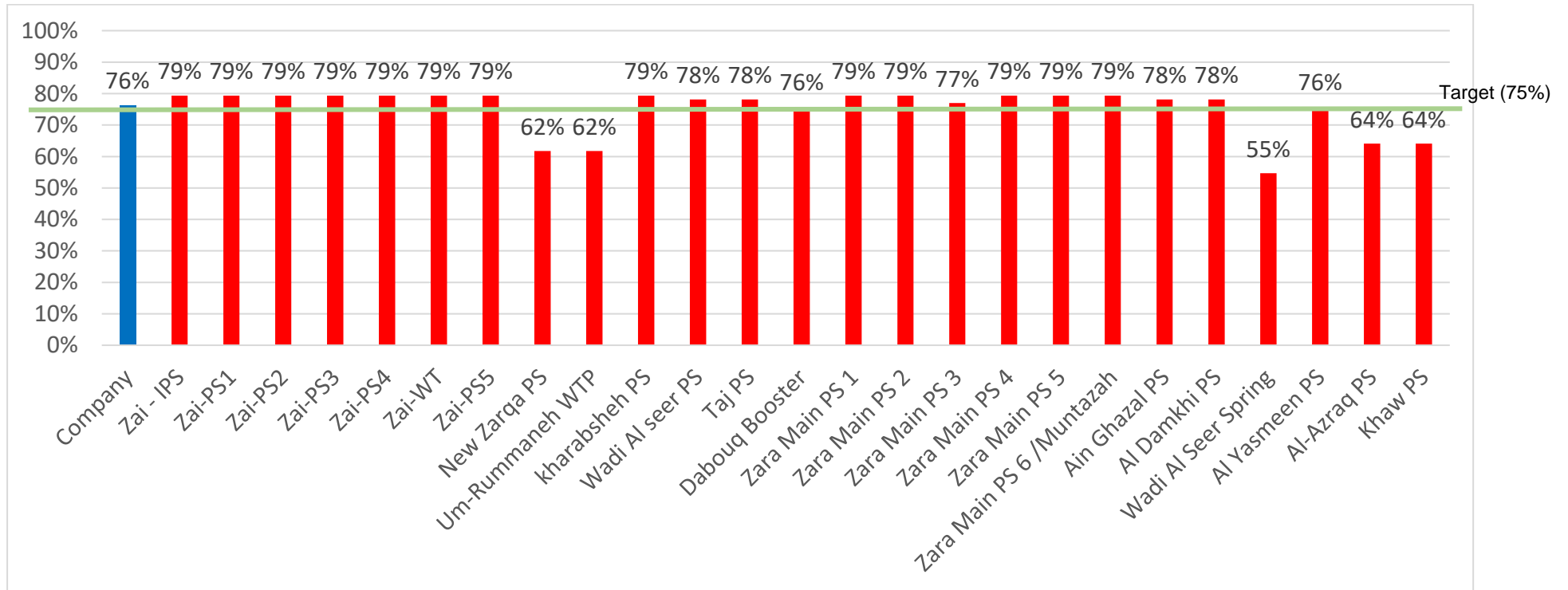


Chart (5): Overall Results

5.1. Company level

The evaluation tool also measures the maturity level of each core element. Charts (6) and (7) show that the company succeeded in achieving the target level of the planning core elements, while it still needs more efforts when it comes to the operational core elements, such as procurement, design and operations.

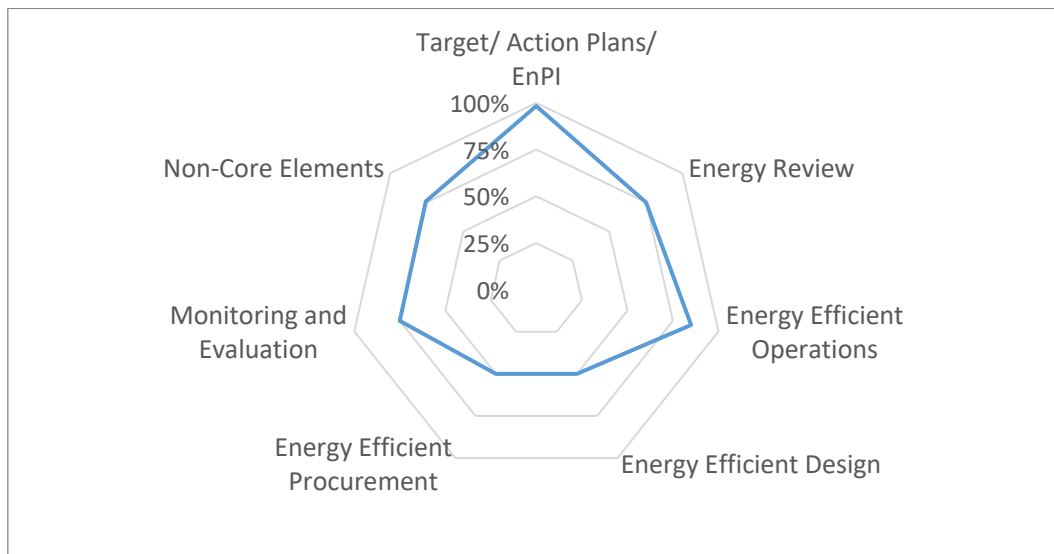


Chart (6): Results per EnMS Element

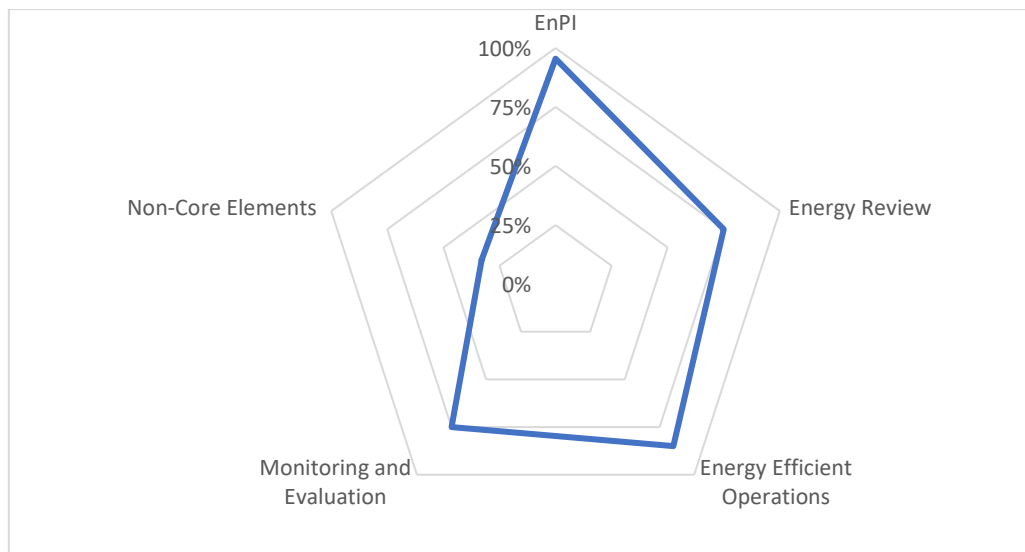


Chart (7): Facility Level - Avg. Result per EnSM Element

6. EnMS Internal Audit Findings

As the EnMS system adopted in the Jordanian Water Sector focuses on six core (central) elements, the internal audits findings were linked to the relevant element, to make easier for stakeholders and decision makers to highlight the actions needed to improve the effectiveness and maturity level of each element.

For each task in the EnMS, if level 3 is not achieved, a nonconformity is issued. While if level 3 is achieved, but level 4 is not, then an improvement opportunity is reported. The following table lists the findings of the EnMS internal audit:

Table (1): EnMS internal audit findings

ID	Element	Major Findings and Areas of Improvements	NC/IO
1	Target/Action Plans/ EnPI's	1) The ESO list has not been updated in 2023	IO
		2) EnMS Objectives are not being set. The objectives should be SMART and should tackle issues that are not necessarily related to energy savings, such as installing SCADA system in a facility, acquiring a data management system that will enable making decisions to improve the energy and EnMS performance, integrating other departments into the EnMS, or spreading awareness about the EnMS within the operations and maintenance staff.	IO
2	Energy Review	1) No baselines were defined in some facilities because of the lack of required data, such as New Zarqa, Um Rummaneh, Yasmeen and Khaw. Instead, absolute values of electricity bills were adopted.	IO

ID	Element	Major Findings and Areas of Improvements	NC/IO
3	Operations	1) SOP's and COP's are not finalized yet for most scope facilities. They need to be approved, communicated and concerned staff shall receive the needed training to implement them.	NC
		2) Proper implementation follow-up should be considered for stations where SOP's are available.	IO
		3) Facilities under Zarqa and Madaba Governorates are not adopting any computerized system to manage the maintenance activities. Accordingly, maintenance planning and reporting is not being conducted properly.	NC
4	Design	1) Although the company has started using WaterGEMS software in the Hydraulic modeling of new pumping stations, no fixed policies are in place to ensure considering data collection and energy efficiency in the design of projects.	NC
5	Procurement	1) LCC concept is not being considered in most relevant procurement cases related to SEUs.	NC
6	Monitoring and Evaluation	1) Measurement and verification (M&V) should be implemented to ensure achieving the energy saving targets in all related projects.	NC
		2) Calibration of measuring equipment, such as power meters, flow meters and pressure gauges is not being conducted on regular bases.	IO

ID	Element	Major Findings and Areas of Improvements	NC/IO
7	Others	1) Two Employee were assigned to work at the E-Unit. However, more employees are needed to join the unit to support the implementation of the EnMS.	IO
		2) There is no allocation of budget needed for continual improvement of energy performance and the EnMS.	NC
		3) Roles and responsibility should be reflected into the relevant energy teams' formulation decisions.	NC
		4) Training should be implemented in a systematic way, and training effectiveness shall be evaluated.	NC
		5) The Energy Unit shall ensure that SOPs are communicated, and concerned staff shall receive the needed training to implement them.	IO
		6) Required internal communication regarding the EnMS should be identified. This includes topics, channels, messages, relevant parties and levels.	NC
		7) Documents control is not being implemented. For example, controlled templates are not used, latest versions of the EnMS procedures are not available for users and documentation master lists are not maintained.	NC
		8) Improvement suggestions channels need to be established in order to make relevant stakeholders able to enrich the ESO list and to improve the EnMS.	IO

ID	Element	Major Findings and Areas of Improvements	NC/IO
		9) Proper root cause analysis to resolve and avoid recurrence of NC's should be implemented.	IO
		10) Management review meeting shall cover all topics listed as inputs to the meeting in the standard, and resulting decisions to be followed up.	IO

7. Recommendations

Based on the internal audit findings, and to enhance the EnMS effectiveness, it is highly recommended that the top management of the company takes the following recommendations into consideration:

- 1) Ensure necessary human and logistic resources are available.
- 2) Conduct More Training and awareness to ensure that all relevant employees and stakeholders are aware of their impact on the EnMS implementation results.
- 3) Motivate people by adopting incentives related to the energy performance of the company.
- 4) Define roles and responsibilities for all related structural units whose activities affect the maturity of the EnMS, such as operations, maintenance, and procurement.
- 5) Support Energy Data Management System (EnDMS) implementation & sustainability.
This would help in ensuring the accuracy of data collected and will support a fact-based decision-making process.
- 6) Anchor Measurement and Verification processes.
- 7) Improve coordination and communication between departments.
- 8) Develop/Finalize and implement operational and maintenance procedures (SOP's) for all facilities included in the EnMS scope of work.
- 9) Apply Life Cycle Costing (LCC) concept when purchasing energy consuming equipment.
- 10) Consider energy performance in the design of new facilities, or even when performing improvement or rehabilitation projects in existing facilities.
- 11) Improve maintenance management systems.
- 12) perform programed calibration of measuring equipment.

End of report



Annex 1: Internal audit checklist- Company level

Annex 2: Internal audit scores - Facilities