Jordan Water Utilities Monitoring Report 2020

Aqaba Wastewater treatment plant
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Abbreviations

AW  Aqaba Water Company
BMZ  German Federal Ministry for Economic Cooperation and Development
CMMs  Computerized Maintenance Management System
COVID-19  Corona Virus Disease of 2019
GIZ  German International Cooperation
H.E.  His Excellency
Hrs.  Hours
IT  Information Technology
JOD  Jordanian Dinar
KfW  Kreditanstalt fur wiederaufbau banking group
JVA  Jordan Valley Authority
Km  Kilometer
KPI  Key Performance Indicator
KWH  Kilo-Watt Hour
Lcd  Liter per capita per day
M  Million
m3  Cubic Meter
MCM  Million Cubic Meter
MoU  Memorandum of Understanding
MWI  Ministry of Water and Irrigation
No.  Number
NRW  Non-Revenue Water
NSPI  National Strategy Performance Indicator
O&M  Operation and Maintenance
PIs  Performance Indicators
PSP  Private Sector Participation
Req.  Request
Sub.  Subscribers
UPMU  Utilities Performance Monitoring Unit
W&WW  Water and Wastewater
WAJ  Water Authority of Jordan
WWTPs  Wastewater Treatment Plants
YWC  Yarmouk Water Company

Opening speech

It is my pleasure to present to you the Annual Performance Monitoring report for the year 2020, as prepared by the Utilities Performance Monitoring Unit (UPMU). It is hoped that annual reports such as this will help the Water Utilities to raise their performance, improve water sector services for the Jordanian population, and assist other developmental sectors with their water needs.

Water Utilities cover operation and maintenance in 9 of the Kingdom’s 12 governorates, and are thus important for ensuring a smooth delivery of water and wastewater service to the citizens of Jordan. The Water Utilities are responsible for ensuring that this vital service, which is essential to developmental activities in the country, is offered in the most efficient and effective manner, and continues to be closely monitored and assessed.

Performance monitoring is very important and critical for building better performing Utilities. It helps them to determine how efficiently their operations and activities are being conducted, and to assess the productivity of management and employees. It also enables the Utilities to evaluate their results against a set of Performance Indicators and targets.

This performance report focuses on monitoring the quality of services provided by the Water Utilities and their level of operational performance towards that end. The monitoring covers the key areas that are needed to assess and analyze the status quo of the Utilities in four major sections: water and wastewater operations, customer services, finance, and human resources.

It proposes a set of recommendations that reflect and highlight current areas of strength and zooms in on areas where there is room for improvement that should be reflected in an implementation plan that ensures a roadmap for improving performance to enable them to provide the highest possible level of service.

While the UPMU is a part of the water sector, it operates as an independent body on the performance of the Water Utilities owned by the Water Authority of Jordan (WAJ) and aims to regulate the relationship between the two. A positive relationship between the Utilities, WAJ, and the UPMU is essential for the water sector to be successful and achieve its goals.

The UPMU’s efforts over the past two years, and the cooperative and supportive culture developed by the Water Utilities and WAJ, are highly appreciated, and I hope that this relationship continues to grow to tackle the challenges facing the water sector in securing the scarce water resources that the kingdom needs.

We extend our gratitude for the financial support provided by the KfW to the UPMU over the past years and into the future. We are also grateful to the GIZ for their continued and sustainable technical support in setting up the UPMU, in cooperation with the water sector.

In conclusion, the annual performance report 2020 will create a new momentum in the water sector to do business differently and more efficiently; to be better prepared; and to add value to the national development.

Eng. Mohammad Al Najjar
Minister of Water and Irrigation
Vision

UPMU Vision

Enhancing the capabilities of Jordanian Water Utilities to provide the best services to customers in an effective and efficient manner.

Mission

UPMU Mission

Monitoring the Jordanian Water Utilities’ performance against an agreed set of indicators, setting performance targets to evaluate and compare performance, and recommending incentives and penalties accordingly, while taking into consideration the need to enhance the Utilities’ financial sustainability.
Foreword
This performance monitoring report for the year 2020 was prepared by the Utilities Performance Monitoring Unit (UPMU), which was established under the Ministry of Water and Irrigation and linked to H.E. the Minister. The report is based on data and information provided by Miyahuna, Aqaba (AW), and Yarmouk (YWC) Water Utilities.

Monitoring Performance is very important, and indeed critical for building better performing utilities. It makes it possible to measure how efficiently they are conducting their operations and activities and assess the productivity of both management and employees. It also enables the UPMU to measure the Utilities’ performance against a set of Performance Indicators (PIs), which will help with the following:

1. Assessing performance against PI’s and performance targets.
2. Setting performance targets for certain indicators.
3. Assessing the achievement of national policy targets and the sector’s overall development.
4. Conducting workshops and round table discussions to exchange experiences.
5. Creating transparency and accountability within the sector and individual Utilities through public reporting.

These results can help the MWI/ WAJ to improve the Utilities’ overall performance and reach its goals and ensure continued provision of high-quality water and wastewater services.

For this report, the UPMU/ GIZ team conducted a continuous review to check the reliability and credibility of data collected for various activities, in cooperation with the three Water Utilities.

This Second annual report shows the performance of Miyahuna, AW and YWY Water Utilities for the year 2020, and is comprised of four sections: Operations, Customer Service, Finance, and Human Resources. Performance is assessed against 10 KPIs and 33 lower-level PIs, along with 11 National Strategy Indicators (NSPI). The results are used to assess the Utilities’ performance and their adherence to the Ministry of Water and Irrigation’s strategic goal of improving and sustaining high-quality water and wastewater services.

The first monitoring report from 2019 included several recommendations, many of which were accepted and have led to improvement actions in the Utilities.

In addition to the above activities, the UPMU:

- Conducted a Workshop for WAJ and the three Utilities to present and discuss the 2019 report and discuss the Memorandum of Understanding (MoU).
- Presented the current situation to the YWC Board of Directors, together with a set of recommendations for further action.
- With support of GIZ, conducted the first round-table workshop on NRW and will later conduct a second workshop to help the Utilities find appropriate solutions for and unify the concept of calculating water loss. Additional roundtables will be conducted on other topics in the future.

The MWI/ UPMU greatly appreciates the KfW’s continuous financial support for maintaining achievements and improving the performance of Jordan’s Water Utilities.

Dr. Ahmad AlAzzam.
UPMU Director
1- Description of UPMU

The UPMU was established in accordance with WAJ Law No. 18 and its amendments in Article (10) to enhance the principles of transparency and good governance in the water sector and improve the legal and contractual relationship between the Ministry of Water and Irrigation (MWI), WAJ, and the Water Utilities.

To meet these objectives, the UPMU performs the following tasks:

1- Monitoring the Utilities' performance and issuing performance reports.
2- Setting and developing performance indicators, baselines, and mechanisms for calculating and using them as a basis for comparing and evaluating the Utilities' performances.
3- Developing and reviewing the necessary documentation for establishing the Utilities and developing their tasks/duties (i.e. Development and Delegation Agreements (Assignment Agreements)).
4- Issuing the basis and general evidence which describe the frameworks for developing internal working guidelines and procedures, such as Business planning and Customer service guidelines as regulatory standards.
5- Reviewing, approving, and accrediting company business plans and setting targets, in cooperation with the Utilities and in accordance with water policies.

A steering committee has been established to supervise the UPMU, chaired by H.E the Minister of Water and Irrigation and with the following members:

1. H.E. Secretary General of WAJ
2. H.E. Secretary General of MWI
3. H.E. Secretary General of JVA
4. Director of Legal Affairs in MWI
5. Assistant Secretary General for Financial Affairs – WAJ
6. Donors Representative
7. King Abdullah II Centre of Excellence Representative

The figure below shows the UPMU’s approved organizational structure:
2- Explanation of the report’s rationale

2.1 Objective of the report

This second annual report is based on data from 2020. It builds on the monitoring and reporting framework which UPMU introduced in its first annual report in 2019.

This second annual report will:

• Establish baseline data for the performance of Jordan’s Water Utilities.
• Define areas where UPMU experts should continue to inspect and, where necessary, investigate the Utilities’ performance.
• Evaluate the Utilities’ operations, showing what they are doing well and highlighting where they are facing challenges in performing their mandate.
• Provide a single, consolidated source of information on Jordan’s Water Utilities for policymakers and stakeholders.
• Establish the UPMU’s role as a mediator through which representatives from different Utilities can meet and exchange their approaches to issues of shared concern.
• Contribute to transparency and accountability, while revealing the challenges and offering pathways for improvement.

2.2 How data was collected and analyzed

With GIZ’s support, the UPMU updated the variables and indicators which were developed earlier. Data for year 2020 was collected and performance analysed to meet the UPMU and Utilities’ tasks and goals in the most efficient and effective manner.

A single Excel spreadsheet was produced to unify data collection. This tool automatically imports data from all Utilities into a single file which calculates all indicators automatically and consolidates data from all Utilities into one master sheet, making it easier to analyse trends and make comparisons between Utilities.

The UPMU expects the reporting procedures to evolve and improve over time as monitoring and analysis capacity increases, and adjustments are potentially made to policies and strategies in the sector. The reporting Utilities will also be able to internally assess their performance against the defined indicators, improving transparency and ensuring that they are not surprised by the results and conclusions in future UPMU reports.

The UPMU supported the Utilities in completing the new Excel spreadsheets within the reporting deadline by clarifying the variables involved and providing training on using the new system. This ensured the accuracy of data and helped to ensure that the Utilities’ staff can make best use of the results.

Nevertheless, there were a number of challenges in compiling and verifying the data which required close cooperation and a strong working relationship between the UPMU and the Utilities’ employees to explain the data sets and their sources, translate terminology, and ensure ownership of the end results. This was especially true in Miyahuna, where data from three governorates (Amman, Zarqa and Madaba) was merged into one sheet. The UPMU expects data collection for year 2021 to go more smoothly and quickly.
Different levels of process automation and digitalization within the Utilities meant that some data were readily available whilst others had to be manually gathered and compiled through spreadsheets. Other technical issues that emerged included operational, financial and commercial bottlenecks, differing time scales between the two processes, and billing data not matching financial data (e.g., annual revenue).

Once data had been collected and verified, the monitoring tool consolidated the three Utility sheets into a master sheet. UPMU experts then examined the numbers and information outputs, analysing and correlating various sets of indicators and grouping them to allow for a better overview of the issues that the report raised. They also went back to the Utilities to verify and clarify certain results to ensure that they had a full understanding the outputs before producing the final analysis.

The outputs were then discussed and cross-checked internally among different categories to provide a more comprehensive overview of the performance and comparison of related indicators. Figures and tables were produced to support the report’s conclusions, with comments and recommendations to help stakeholders understand various outcomes.

This second annual report will be published and shared with senior management and stakeholders to identify and prioritize areas where improvements and interventions are necessary.

The UPMU report analysed and assessed all 10 KPIs and 23 of the 33 lower-level PIs, along with 9 of the 11 National Strategy Indicators (NSPI)
3- Performance Indicators

3.1 Operational Performance

The first group of indicators, which look at operational performance, is divided into six sections:
a. The first section addresses water quality assurance.
b. The second section is concerned with increasing the use of technology to improve energy efficiency.
c. The third section focuses on aspects that have a direct influence on making operations more efficient and cost effective.
d. The fourth section looks at bulk metering, which can give a better understanding of the percentage of Non-Revenue-Water (NRW).
e. The fifth section uses four different indicators to analyse water losses, which includes both real losses and apparent losses.
f. Last section consists of two PIs that represent actual water losses in the network and describes the volume of water supplied by the Utilities per capita.

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<th>Unit</th>
<th>No. of Variables</th>
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<td>Microbiological water quality compliance</td>
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<td>Water quality tests performed</td>
<td>PI</td>
<td>% of req. tests</td>
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<td>3</td>
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<td>Effluent quality compliance</td>
<td>NSPI</td>
<td>%</td>
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<td>5</td>
<td>Average unit energy consumption</td>
<td>PI</td>
<td>kWh/m³</td>
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<td>6</td>
<td>Renewable energy utilization</td>
<td>NSPI</td>
<td>%</td>
<td>5</td>
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<td>7</td>
<td>Power consumption monitoring</td>
<td>NSPI</td>
<td>%</td>
<td>2</td>
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<td>8</td>
<td>Speed of repair of failures</td>
<td>PI</td>
<td>% of bursts</td>
<td>4</td>
<td></td>
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<td>9</td>
<td>Preventive maintenance of pumps</td>
<td>NSPI</td>
<td>%</td>
<td>2</td>
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<td>10</td>
<td>Corrective maintenance of pumps</td>
<td>NSPI</td>
<td>%</td>
<td>2</td>
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<td>11</td>
<td>Sizing of pumps</td>
<td>NSPI</td>
<td>%</td>
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<td>12</td>
<td>Operational well and reservoir meters</td>
<td>NSPI</td>
<td>%</td>
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<td>13</td>
<td>Calibration of well and reservoir meters</td>
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<td>14</td>
<td>Metering of import and export points</td>
<td>NSPI</td>
<td>%</td>
<td>2</td>
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<td>15</td>
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<td>% of system input</td>
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<td>16</td>
<td>Water loss per subscriber</td>
<td>PI</td>
<td>m³/subscriber/day</td>
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<td>17</td>
<td>Water losses per mains length</td>
<td>PI</td>
<td>m³/km/day</td>
<td>3</td>
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<tr>
<td>18</td>
<td>Water losses per connection per day</td>
<td>PI</td>
<td>m³/connection/day</td>
<td>4</td>
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<tr>
<td>19</td>
<td>Inefficiency of use of water resources</td>
<td>PI</td>
<td>%</td>
<td>5</td>
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<tr>
<td>20</td>
<td>Water resources use per capita/day</td>
<td>PI</td>
<td>l/cap/day</td>
<td>4</td>
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</table>

Table 1: Operation sections and indicators

3.2 Customer Service Performance

The second group of indicators looks at service reliability, complaints, and the responsiveness of service providers, as well as commercial & customer processes.

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<th>Unit</th>
<th>No. of Variables</th>
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<tr>
<td>1</td>
<td>Supply Mode &amp; Efficiency</td>
<td>Continuity of supply</td>
<td>KPI</td>
<td>% of time</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Subscribers receiving continuous supply</td>
<td>PI</td>
<td>%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Water consumption per capita (residential subscribers)</td>
<td>KPI</td>
<td>Liters/capita/day (lcd)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>New connection efficiency</td>
<td>KPI</td>
<td>% of requests</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Percentage of inactive subscribers</td>
<td>PI</td>
<td>%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Subscriber meter replacement ratio</td>
<td>PI</td>
<td>%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Meter reading ratio</td>
<td>PI</td>
<td>%</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>&quot;No Water&quot; complaints</td>
<td>KPI</td>
<td>No. of complaints/1000 active subscribers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Billing complaints</td>
<td>PI</td>
<td>No. of complaints/1000 active subscribers</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Customer service sections and indicators

3.3 Financial performance

While the main aim of the water sector is to provide high quality water and wastewater services, achieving financial sustainability is both a vital target and a major, critical challenge for Jordan’s Water Utilities for the following reasons:

- High levels of Non-Revenue-Water
- Strict limitations on raising water tariffs
- High energy costs and increasing electricity tariffs
- Insufficient funding to support infrastructure improvement and maintain daily operations to meet increases in demand for water and wastewater services

Therefore, taking the above constraints and challenges into account, the Water Utilities must work in a transparent, accountable, economic, and efficient manner to improve their financial performance. If the Utilities are not allowed to raise tariffs, the government must fulfill its promises to provide subsidies. Incentives should also be offered to motivate the Utilities to improve their performance and ensure continuous development.
3.4 Human Resources performance

The last group analyses employees’ efficiency, capability, and capacity building measures.

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<tr>
<th>Ser.</th>
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<th>Unit</th>
<th>No. of Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staff Utilization &amp; Efficiency</td>
<td>Employees per 1000 subscribers Water &amp; Wastewater (W&amp;W)</td>
<td>KPI</td>
<td>No/1000 subscribers</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Employees per 1000 subscribers W</td>
<td>PI</td>
<td>No/1000 subscribers</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Training per employee</td>
<td>KPI</td>
<td>Hr/employee</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Percentage of staff trained</td>
<td>PI</td>
<td>%</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4: Human Resources section and indicators

Water Utilities’ Performance in 2020

Leak detection in Miyahuna
4- Water Utilities’ Performance in 2020

4.1 Utilities key data - 2020
The table below shows key data for the three Water Utilities:

<table>
<thead>
<tr>
<th>Area (km²)</th>
<th>Water subscribers</th>
<th>Sewage subscribers</th>
<th>Employees</th>
<th>Water distributed (MCM)</th>
<th>Authorised consumption (MCM)</th>
<th>Amount billed in period (Mio JOD)</th>
<th>Estimated water service coverage (%)</th>
<th>Estimated wastewater coverage [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miyahuna</td>
<td>13,286</td>
<td>970,718</td>
<td>760,449</td>
<td>2,287</td>
<td>313.671</td>
<td>170.697</td>
<td>98</td>
<td>77.5</td>
</tr>
<tr>
<td>AW</td>
<td>6,905</td>
<td>44,508</td>
<td>38,098</td>
<td>394</td>
<td>28,697</td>
<td>18,092</td>
<td>100</td>
<td>50.5</td>
</tr>
<tr>
<td>YWC</td>
<td>28,990</td>
<td>361,752</td>
<td>174,355</td>
<td>1,407</td>
<td>106,913</td>
<td>54,077</td>
<td>96</td>
<td>46.3</td>
</tr>
</tbody>
</table>

Table 5: Utilities key data 2020

4.2 Operational performance

4.2.1 Quality Assurance & Control

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quality Assurance &amp; Control</td>
<td>%</td>
<td>99.7</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Microbiological water quality compliance</td>
<td>% of req. tests</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Physical-chemical water quality compliance</td>
<td>%</td>
<td>99.9</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Effluent quality compliance</td>
<td>%</td>
<td>99.3</td>
<td>100</td>
<td>87.5</td>
</tr>
</tbody>
</table>

Table 6: Quality Assurance & Control at the end of 2020

• Water quality remains very high for the year 2020, with microbiological water quality compliance for the three Utilities rated as excellent. Assessments of the procedures for monitoring and responding to cases of non-compliance will form part of the inspections protocol that the UPMU will develop and implement.

• The three Utilities are also rated as excellent for water quality tests performed and physical-chemical water quality compliance.

• While both Miyahuna and AW are above the Jordanian minimum acceptable threshold of 95% for effluent quality compliance, YWC is below the threshold with 87%, which is a drop of 4% from 2019’s figure of 91%.

• The YWC should seek other options for improving the efficiency of Wastewater Treatment Plants (WWTPs).
4.2.2 Energy Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Energy Efficiency</td>
<td>Average unit energy consumption KWh/m³</td>
<td>3</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Renewable energy utilization %</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Power consumption monitoring %</td>
<td>43.1</td>
<td>100</td>
<td>95</td>
</tr>
</tbody>
</table>

Table 7: Energy Efficiency at the end of 2020

- The stark difference in average unit energy consumption is caused by Jordan’s geography and the Utilities’ modes of operation. Miyahuna in particular is pumping most of its produced water from 400 meters below sea level to more than 1,000 meters above sea level, and YWC is partly pumping from the Jordan valley as well, in addition to the fact that the mode of operation in YWC is direct pumping in the network. Whereas AW’s water is supplied by gravity from the mountains overlooking Aqaba.

- None of the three Utilities are producing renewable energy, which would represent a cost saving.

- The Utilities could all achieve financial savings by continuously monitoring pump consumption.

- Since Zarqa does not monitor the power consumption of pumps, Miyahuna should focus on monitoring in the Zarqa governorate.

4.2.3 Response Time & Repair Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td>Speed of repair of failures of network % of bursts</td>
<td>95.9</td>
<td>100</td>
<td>94.7</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Preventive maintenance of pumps %</td>
<td>97.3</td>
<td>100</td>
<td>31.9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Corrective maintenance of pumps %</td>
<td>21.3</td>
<td>51.4</td>
<td>79.5</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Sizing of pumps (Percentage of pumps running at the right curve) %</td>
<td>80.1</td>
<td>100</td>
<td>29.2</td>
</tr>
</tbody>
</table>

Table 8: Response Time & Repair Efficiency at the end of 2020

- The three Utilities are performing well in responding to network failures within target times. The UPMU needs the inspection report that prepared by WAJ/Crisis Management and Control Directorate before it can properly investigate the reality and credibility of variables for this indicator.

- Miyahuna is implementing a program of preventive pump maintenance for most of its pumps. As mentioned in the 2019 report, AW implemented preventive maintenance for all their pumps as per the computer maintenance management system (CMMS). While YWC did not carry out any preventive maintenance for their pumps in 2019, they showed an improvement in 2020. YWC needs to implement CMMS.

- Preventive maintenance is perquisite for reducing the level of corrective maintenance per pump.

- Pump sizing directly impacts optimal energy consumption, and its effect on electricity expenses.
(KWh/m$^3$) will be analysed in the financial efficiency subchapter.

- YWC needs to replace its current inefficient gravity pumps with variable speed pumps.

4.2.4 Bulk metering

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Operational well and reservoir meters</td>
<td>%</td>
<td>89.9</td>
<td>57.6</td>
<td>86.4</td>
</tr>
<tr>
<td>13</td>
<td>Calibration of well and reservoir meters</td>
<td>%</td>
<td>35.7</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>14</td>
<td>Metering of import and export points</td>
<td>%</td>
<td>100</td>
<td>100</td>
<td>83.3</td>
</tr>
</tbody>
</table>

Table 9: Bulk Metering at the end of 2020

- All the Utilities need to pay more attention to having all their production and supply points metered and calibrated on a permanent basis.
- The calibration of bulk water meters for wells, reservoirs, and import/export points is a fundamental prerequisite for reliable NRW calculations. Miyahuna in particular should pay more attention to this issue.
- All export/import points in Miyahuna and AW are metered. YWC only meters 83% of its import and export points, and must implement procedures to ensure that they reach 100%.
- The UPMU will verify the calibration of wells and reservoir meters for the Utilities in the next report.

4.2.5 Water Losses

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Non-Revenue Water</td>
<td>% of system input</td>
<td>46.1</td>
<td>37.0</td>
<td>49.5</td>
</tr>
<tr>
<td>16</td>
<td>Water loss per subscriber</td>
<td>m$^3$/subscriber/day</td>
<td>0.4</td>
<td>0.65</td>
<td>0.4</td>
</tr>
<tr>
<td>17</td>
<td>Water loss per mains length</td>
<td>m$^3$/km/day</td>
<td>25.46</td>
<td>27.54</td>
<td>12.38</td>
</tr>
<tr>
<td>18</td>
<td>Water loss per connection per day</td>
<td>m$^3$/connection/day</td>
<td>1.16</td>
<td>1.4</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Table 10: Water Loss at the end of 2020

- Percentage of NRW has increased in Miyahuna and YWC since 2019, more efforts are needed to reduce this percentage.
- Water losses remain high, according to international standards. This is of particular concern for a water-scarce country such as Jordan.
• The other three indicators are easy to understand and have been widely used, and it is important to look at variations in the different indicators related to water loss, i.e., losses per subscriber, km of network, and connection.

• During June 2021, the UPMU conducted the first session on the NRW round table. The second session will be conducted in October-November 2021 with the Utilities, WAJ, GIZ, and various experts to unify the concept of NRW and exchange experiences.

4.2.6 Network Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>Cluster</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Network Efficiency</td>
<td>Inefficiency of use of water resources</td>
<td>% of use of water resources</td>
<td>19.8</td>
<td>18.5</td>
<td>24.4</td>
</tr>
<tr>
<td>20</td>
<td>Water resources use per capita/day</td>
<td>lcp</td>
<td>125.4</td>
<td>369.1</td>
<td>97.4</td>
<td></td>
</tr>
</tbody>
</table>

Table 11: Network Efficiency at the end of 2020

• The inefficiency of water resource usage is calculated by multiplying NRW volumes by an estimated real losses ratio. The Utilities currently estimate this ratio at about 50%, and the UPMU will use results from the second round-table discussion to develop a better understanding for estimating.

• Per-capita consumption of water resources is by far the highest for AW, due to the influence of commercial and industrial customers.

4.3 Customer service performance

4.3.1 Supply Mode & Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuity of supply</td>
<td>% of time</td>
<td>21.3</td>
<td>100</td>
<td>5.4</td>
</tr>
<tr>
<td>2</td>
<td>Supply Mode &amp; Efficiency</td>
<td>Subscribers receiving continuous supply</td>
<td>%</td>
<td>3.2</td>
<td>93.3</td>
</tr>
<tr>
<td>3</td>
<td>Water consumption per capita (residential subscribers)</td>
<td>Liters/capita/day (lcd)</td>
<td>54.1</td>
<td>76.4</td>
<td>45.6</td>
</tr>
</tbody>
</table>

Table 12: Supply Mode & Efficiency at the end of 2020
• UPMU reports on the percentage of time that subscribers receive water. For AW, as expected with continuous supply, the system is pressured 168 Hrs. per week, Miyahuna almost 36 Hrs., and YWC 9 Hrs.

• While a significant number of subscribers receive a continuous supply in Aqaba, the percentage for other utilities is low and shows no signs of improvement.

• The water consumption for residential subscribers showed a decline in litres per capita per day in 2020 compared to 2019, due to change in the average family size per subscription as calculated based on the water services coverage per utility.

4.3.2 Commercial & Customer Processes

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Commercial &amp; Customer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Processes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New connection efficiency</td>
<td>% of</td>
<td>83.5</td>
<td>100.0</td>
<td>87.7</td>
</tr>
<tr>
<td>5</td>
<td>Percentage of inactive</td>
<td>%</td>
<td>9.5</td>
<td>6.7</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>subscribers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Subscriber meter replacement</td>
<td>%</td>
<td>2.4</td>
<td>43.4</td>
<td>2.6</td>
</tr>
<tr>
<td>7</td>
<td>Meter reading ratio</td>
<td>%</td>
<td>103.4*</td>
<td>97.6</td>
<td>97.9</td>
</tr>
</tbody>
</table>

Table 13: Commercial & Customer Processes at the end of 2020

• AW has the highest level of service efficiency for new type 1 & 2 connections at 100% within target time. Miyahuna declined from 87.5% in 2019 to 83.5% in 2020 due to merging with the Zarqa and Madaba Water governorates, while YWC's new connection efficiency increased from 85% in 2019 to almost 88% in 2020. However, YWC complied with the UPMU’s recommendations to compile the manual registers and spreadsheets from its 10 regional operating units to manage the documentation for new connections.

• The percentage of inactive subscribers for the three Utilities increased in 2020 due to COVID-19 and lock down. The notable increase in AW’s figures from 3.4% in 2019 to 6.7% in 2020 was due to the fact that 2019’s figures did not include customers from Disi village.

• The three Utilities have been engaged in replacing water meters. AW has the highest rate of meter replacement because it has started replacing mechanical meters with smart meters, which have proved more efficient and reliable than mechanical meters in continuous supply systems.

• The meter reading ratios for the three Utilities are high, and exceeded 100% in Miyahuna due to:
  - Issuing monthly water bills for big customers rather than quarterly.
  - Bills issued in the third quarter are high to recover the interruption of issuing bills in the first and second quarters during lock down.
4.3.3 Customer Relationship & Satisfaction

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Customer Relationship &amp; Satisfaction</td>
<td>No. of complaints/1000 active subscribers</td>
<td>298.1</td>
<td>57.1</td>
<td>287.2</td>
</tr>
<tr>
<td>9</td>
<td>Billing complaints</td>
<td>No. of complaints/1000 active subscribers</td>
<td>19.4</td>
<td>24.1</td>
<td>18.3</td>
</tr>
</tbody>
</table>

Table 14: Customer Relationship & Satisfaction at the end of 2020

- The annual percentage of “no water” complaints during 2020 are quite substantial for Miyahuna and YWC at 29.8% and 28.7% respectively. AW, which has a continuous water supply, reduced the annual percentage of “no water” complaints from 7% in 2019 to 5.7% in 2020. This was because there was more water available for residential customers since non-residential customers (hotels) were at minimum consumption during lock down.

- The UPMU recommends minimising the repetition of no water complaints, and the Utilities are trying hard to comply with this requirement.

- The percentage of billing complaints remains low and acceptable. The substantial increase in Miyahuna is due to merging Zarqa and Madaba governorates. The percentage of billing complaints decreased for both AW and YWC, which indicates improved performance.

4.4 Financial performance

4.4.1 Financial Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Collection Efficiency (Customers)</td>
<td>%</td>
<td>87.9</td>
<td>88.9</td>
<td>72.0</td>
</tr>
<tr>
<td>2</td>
<td>Collection ratio</td>
<td>%</td>
<td>86.1</td>
<td>84.2</td>
<td>84.4</td>
</tr>
<tr>
<td>3</td>
<td>Electricity costs as percentage of total O&amp;M costs</td>
<td>%</td>
<td>51.6</td>
<td>19.4</td>
<td>51.5</td>
</tr>
<tr>
<td>4</td>
<td>Delay in accounts receivable</td>
<td>months</td>
<td>7.75</td>
<td>8.1</td>
<td>17.6</td>
</tr>
<tr>
<td>5</td>
<td>Operating cost coverage ratio (Collection)</td>
<td>%</td>
<td>77.1</td>
<td>71.6</td>
<td>45.8</td>
</tr>
</tbody>
</table>

Table 15: Financial Efficiency at the end of 2020
• Collection Efficiency and collection ratio measures the Utilities’ ability to cover issued billings from collection processes. Liquidity is considered a strong indicator for assessing the Utilities’ collection performance. Collection efficiency for all three Utilities declined between 2019 and 2020 (Miyahuna from 99.3% to 87.9%, AW from 98.7% to 88.9%, and YWC from 75.7% to 72%), due to the following:

  - The lock down that took place during quarters I and II of 2020 due to COVID-19
  - The implementation of Defence Laws which prevented the Utilities from disconnecting water supplies for non-performing customers
  - Reductions in the size of the work force of between 25% and 50% due to the COVID-19 pandemic, which affected daily operational performance

The UPMU advised AW to segregate collection of billing from other collections in their accounting and billing system. While the collection ratio for Miyahuna and AW declined during 2020, this indicator improved for the YWC from 73.7% in 2019 to 84.4% in 2020. As figures for YWC are neither final nor verified by the external auditor, the UPMU cannot verify this indicator.

• Electricity costs as a percentage of total O&M costs measures the segment size of electricity cost to total O&M cost. Although electricity consumption (KW/h) has increased in 2020, electricity costs were reduced for all the Utilities¹ for the following reasons:

  - The electricity Tariff was reduced
  - Electricity bills were exempted from fuel differences during 2020

• There were delays in the time frame for accounts receivable measures (Collecting Period) for the Utilities to collect outstanding receivable balances (Measure of liquidity)². The formula used in 2019 included Total Accounts Receivable (Accounts Receivable from Billing & Other Receivables) / Billing on a monthly basis. This was updated in 2020 to Accounts Receivable from Billing (excluding other receivables) / Billing on a monthly basis to reflect the water and wastewater sales.

The ageing of receivables decreased in Miyahuna from 8.65 months during 2019 to 7.75 months during 2020 due to the implementation of a new formula where receivables from billing only is calculated net of other receivables, and improvements in collection.

The delay in Accounts receivable for AW and the YWC increased from 6.24 and 14.36 months respectively during 2019 to 8.1 and 17.63 months between 2019 and 2020. This was caused by reductions in collections due to the negative impact of COVID-19, which increased accounts receivable and thus negatively affected the Utilities’ liquidity.

• The operating cost coverage ratio (collection) measures the ability of collection to cover O&M costs (Measure of Liquidity).

In Miyahuna, the ratio declined during 2020 due to increases in the cost of O&M.

The ratio in AW declined during 2020 due to increases in the cost of O&M caused by increases in water purchases and end of service provision.

The ratio for YWC improved slightly during 2020.

4.4.2 Financial Sustainability (Profitability)

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Operating cost coverage ratio</td>
<td>%</td>
<td>90.1</td>
<td>122.0</td>
<td>58.3</td>
</tr>
<tr>
<td></td>
<td>(revenues)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Operating cost coverage ratio</td>
<td>%</td>
<td>89.5</td>
<td>85.1</td>
<td>54.3</td>
</tr>
<tr>
<td></td>
<td>(billing)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 16: Financial Sustainability (Profitability) at the end of 2020
• Operating cost coverage ratio (revenues) measures the ability of revenue to cover the cost of operations and maintenance.

The Operating Cost coverage ratio (Revenue) for Miyahuna declined from 94.4% during 2019 (Miyahuna-Amman) to 90.1% during 2020 due to increases in the cost of O&M and the merging of Zarqa and Madaba governorates. The indicator for AW declined from 124.7% during 2019 to 122% during 2020 due to an increase in "end of service indemnity provision," as per the Jordanian labour law. The indicator increased slightly for YWC from 56.3% during 2019 to 58.3% during 2020. This has not yet been audited by an external auditor.

(Measure of Profitability). The ratio for Miyahuna (Billing) increased slightly during 2020, and declined in AW and YWC.

4.4.3 Profitability Unit

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit Profitability- JOD/m³</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Average water and wastewater revenue for billed consumption</td>
<td>JOD/m³</td>
<td>0.83</td>
<td>0.89</td>
<td>0.72</td>
</tr>
<tr>
<td>9</td>
<td>Unit operating cost water and wastewater services</td>
<td>JOD/m³</td>
<td>1.06</td>
<td>1.1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Table 17: Unit Profitability at the end of 2020

• Average water and wastewater revenue for billed consumption measures Revenue per cubic meter. The Utilities’ Revenue per cubic meter has increased during 2020 since the UPMU has modified the formula for this indicator to include the following revenues in addition to water sales: billing for illegal usage, billing from tanker sales, residential wastewater services, and non-residential wastewater services.

• Unit operating cost of water and wastewater services measures Cost per cubic meter. The UPMU has modified the formula for this indicator to include wastewater operating costs (excluding water Capital Cost), in addition to water operating costs. Miyahuna and AW’s operating costs increased during 2020, but decreased for YWC.

Note: YWC does not segregate water cost from Wastewater cost.
4.5 Human Resources performance

4.5.1 Staff Utilization & Efficiency

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Employees per 1000 subscribers (W&amp;WW)</td>
<td>No/1000 subscribers</td>
<td>1.3</td>
<td>4.3</td>
<td>2.6</td>
</tr>
<tr>
<td>2</td>
<td>Employees per 1000 subscribers W</td>
<td>No/1000 subscribers</td>
<td>2.4</td>
<td>8.0</td>
<td>3.9</td>
</tr>
<tr>
<td>3</td>
<td>Training per employee</td>
<td>Hour/Employee</td>
<td>2.2</td>
<td>14.1</td>
<td>0.7</td>
</tr>
<tr>
<td>4</td>
<td>Percentage of staff trained</td>
<td>%</td>
<td>10.9</td>
<td>41.5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Table 18: Staff Utilization & Efficiency at the end of 2020

- Staff efficiency, expressed in employees per 1,000 subscribers, is acceptable for the three Utilities.
- Training per employee showed a significant reduction due to the impact of COVID-19. AW performed better than the other Utilities.
- Figure 38 shows that YWC has the lowest percentage of staff trained.

4.6 Effect of merging Zarqa and Madaba governorates to Miyahuna

At the beginning of 2020, Zarqa and Madaba governorates merged with Miyahuna-Amman to form one Utility. This led to major changes in some performance indicators, as shown in the table below:

<table>
<thead>
<tr>
<th>Ser.</th>
<th>PI Name</th>
<th>Unit</th>
<th>Amman</th>
<th>Zarqa</th>
<th>Madaba</th>
<th>Miyahuna</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-Revenue Water</td>
<td>% of system input</td>
<td>40.6</td>
<td>56.0</td>
<td>41.8</td>
<td>46.1</td>
</tr>
<tr>
<td>2</td>
<td>Collection Efficiency (Customers)</td>
<td>%</td>
<td>89.4</td>
<td>85.6</td>
<td>65.5</td>
<td>87.9</td>
</tr>
<tr>
<td>3</td>
<td>Water consumption per capita (residential subscribers)</td>
<td>L/c/d</td>
<td>58.0</td>
<td>41.3</td>
<td>63.3</td>
<td>54.1</td>
</tr>
<tr>
<td>4</td>
<td>&quot;No water&quot; complaints per 1000 subscribers</td>
<td>No. of complaints/1000 active subscribers</td>
<td>269.7</td>
<td>433.2</td>
<td>180.8</td>
<td>298.1</td>
</tr>
<tr>
<td>5</td>
<td>Meter reading ratio</td>
<td>%</td>
<td>107.4</td>
<td>92.0</td>
<td>89.8</td>
<td>103.4</td>
</tr>
<tr>
<td>6</td>
<td>Delay in accounts receivable</td>
<td>months</td>
<td>5.8</td>
<td>16.6</td>
<td>18.9</td>
<td>7.11</td>
</tr>
</tbody>
</table>

Table 19: List of Indicators for Miyahuna governorates at the end of 2020
• As shown in the figure 39 NRW% for Miyahuna-Amman (standalone) increased from 38.7% in 2019 to 40.6%. Furthermore, to 46.1% when merge with Zarqa and Madaba took place.

![Figure 39: Non-Revenue Water for Miyahuna governorates](image)

- The collection efficiency for Miyahuna-Amman (standalone) declined from 89.4% to 87.9% when merged with Zarqa and Madaba. This is considered a negative indicator for Miyahuna liquidity.

![Figure 40: Collection Efficiency (Customers) for Miyahuna governorates](image)

- As shown in figure 41, Zarqa has the lowest water consumption per capita, which affected Miyahuna’s overall consumption per capita.

![Figure 41: Water consumption per capita (residential subscribers-billed) for Miyahuna governorates](image)

- As mentioned above, the merger with Zarqa increased the number of Miyahuna’s water complaints.

![Figure 42: “No water” complaints per 1000 subscribers for Miyahuna governorates](image)

- Zarqa and Madaba must put more effort into improving their meter reading ratio.

![Figure 43: Meter reading ratio for Miyahuna governorates](image)

- The merger of Zarqa and Madaba led to an increase in the collection period.

![Figure 44: Delay in accounts receivable for Miyahuna governorates](image)
4.7 Recommendations from the analyses to Utilities

1. The Utilities should create their own data banks to gather information on all activities. This should collect, update, and analyse data to obtain accurate and reliable information that can assist in decision making and furnish stakeholders with the data they need.

2. The Utilities should revise and update their existing emergency response plans to ensure that they are capable of meeting any unforeseen challenges and of mitigating risks, such as water shortages during the summer season.

3. The Utilities should empower their internal auditing units by developing a skilful and dedicated staff with the necessary authority to carry out their duties effectively.

4. The Utilities are recommended to enhance public awareness and create communication channels with local communities that target all segments of society, and should apply penalties to customers who waste water resources.

5. The YWC should seek better options for improving performance in wastewater treatment plants (WWTPs) efficiency.

6. The YWC should change its mode of operations. Replacing existing pumps with variable speed pumps might be an option.

7. The YWC is advised to conduct hydraulic analyses for its water distribution network to convert the system from direct pumping to distribution by gravity.

8. Reiterate the importance of installing CMMS in YWC.

9. The Utilities should improve monitoring power consumption to keep it within an acceptable range.

10. The Utilities are advised to search for effective, cost saving sources of renewable energy.

11. The UPMU recommends that the Utilities promote private sector participation (PSP) in their business activities.

12. The Utilities are advised to increase collection to reflect positively on their collection efficiency.

13. AW is advised to segregate collection of billing from other collections in their accounting and billing system.

14. YWC should segregate water operations expenses from wastewater operations expenses.

15. To enhance collection, the Utilities should implement the Public Funds law (Amiri Law) and follow up effectively on collection procedures.

16. The YWC’s finance department is advised to have a clear structure and specify job descriptions for staff members to enhance the internal control environment and financial reporting.

17. The Utilities are advised to intensify their training programs to improve staff skills.
5- Thematic/strategic deep dives

This chapter provides an analysis and outlook that goes beyond individual indicators on topics that the UPMU sees as strategically relevant to the sector.

5.1 Financial challenges

Some of the financial challenges facing the Water Utilities include:

- High electricity costs
- Inability to cover O&M costs due to low water tariffs
- High levels of NRW
- Low collection efficiency

High Electricity costs:
Despite a slight reduction in tariffs, electricity costs still represent the highest segment of O&M costs, which has a negative impact on financial performance as shown in the table below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Miyahuna</th>
<th>AW</th>
<th>YWC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>2018</td>
<td>2019</td>
<td>2020</td>
</tr>
<tr>
<td>Electricity Expenses</td>
<td>80,518</td>
<td>85,329</td>
<td>77,063</td>
</tr>
<tr>
<td>O&amp;M Expenses</td>
<td>134,922</td>
<td>144,514</td>
<td>145,995</td>
</tr>
<tr>
<td>% of Electricity from O&amp;M</td>
<td>60%</td>
<td>59%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Table 20: Utilities' O&M and Electricity Expenses 2018-2020

Recommendations:

- The Water Utilities are strongly advised to conduct studies on energy efficiency measures to reduce electricity consumption, and to search for alternative sources of renewable energy.
- The Water Sector management should open communication channels with the EMRC (Energy and Mineral Resources Commission) to discuss a favourable tariff for electricity consumption, since the current tariff places such a substantial financial burden on operating expenses.
- Low Water Tariff:

Despite restructuring water tariffs in 2020, the Water Utilities remain unable to cover their operating costs.

Recommendations:

- Decision makers should gradually restructure the water tariff to cover O&M costs and reduce dependency on governmental subsidies.
- The Utilities should monitor and control operational and maintenance expenditures.
- Management should properly implement budgeting and financial planning since budgeting is seen as a key tool for the Utilities to monitor and control expenditures and forecast future financial performance.

High levels of Non-Revenue Water:
The Utilities should increase their efforts to reduce NRW, which will lead to:

- Decreased O&M costs
- Increased revenue generation from billing
- Increased availability of water for customers

Collection Efficiency:
Improving collection efficiency is an excellent way for the Water Utilities to improve liquidity. This could be achieved through:

- Putting practical incentive plans in place to motivate members of the collection teams to meet their set targets
- Implementing the Public Funds law (Amiri Law)
- Outsourcing through PSP to improve:
  - Collection of aged outstanding receivables
  - Collection from illegal sewerage connections, added floors, and annual sewerage agreements

5.2 Financial Statement Analysis

5.2.1 Miyahuna-Amman

Other Receivables:

- Jordan Post Office:
The Jordan Post Office's balance has increased by 34% over the course of the year from JOD 538,609 in 2019 to JOD 719,272 in 2020. It is recommended that the existing collection agreement is followed up and reviewed.

- Receivables of Water and Wastewater Subscribers:
The merger of the Zarqa and Madaba governorates led to the receivable balance increase by 74% from JOD 41.57 M in 2019 to JOD 72.35 M in 2020. This increase has a negative effect on the Utilities’ financial performance and liquidity.

- Electricity Payables:
The electricity payable balance has increased by 93% from JOD 31.94 M in 2019 to JOD 61.80 M in 2020.

- Sewage Tax 3%:
The balance of sewage Tax has increased from JOD 22.90 M in 2019 to JOD 24.46 M in 2020. This balance represents the amount vested by the Municipalities towards Miyahuna.

5.2.2 Miyahuna-Zarqa

Collections represents 73% of total revenue earned during 2020.

The classification of accounts by the external auditor for the audited financial year 2020 differ from year 2019 classification (Comparative Issue).
The Zarqa Water Utility supplies YWC with water. The outstanding unsettled receivable balance as of 2020 is JOD 2.28 M.

Other receivables – Sewage Tax 3%:
This account represents the receipt of 3% wastewater Tax from the Zarqa and Rusaifeh municipalities, which at the end of 2020 reached JOD 6.6 M.

The balance of Trade Receivables – (Subscriptions) has increased to JOD 19.8 M during 2020. Collection procedures need to be improved.

The electricity payable balance has increased to JOD 9.8 M in 2020.

5.2.3 Miyahuna-Madaba
Collections represent 66% of total revenue earned during 2020.

The classification of accounts by the external auditor for the audited Financials year 2020 differ from year 2019 classification (Comparative Issue).

5.2.4 AW Financial Statement Analysis
Trade receivables / Customer Subscribers’ balance has increased by JOD 2.60 M during 2020 compared to 2019.

A provision for end of service indemnities of JOD 2.1 M was accounted for in 2020.

5.2.5 YWC Financial Statement Analysis
The YWC financial statement had not been finalised or verified by the external auditor by the date the UPMU report was issued, so further analyses could not be performed.

5.3 Internal audit
Internal audits provide independent assurance that an organization’s risk management, governance, and internal control processes are operating effectively.

Although there are skilful staff in this field, the Utilities still lack sufficient resources for the internal audit unit to perform activities regularly and adequately.

The UPMU and GIZ will invite relevant staff from the Utilities, external experts, and other stakeholders to exchange their knowledge, and to define what the Utilities need to do to reach the best international practice in this area.
6- Performance targets (Benchmarking)

Benchmarking is a key regulatory tool for assessing and improving performance by allowing the Utilities to compare their results against similar entities and their own historical trends. Performance targets are set to:

- Turn the objectives of the Utilities’ business plans into specific goals that are connected to fixed time frames
- Bring the Utilities closer to international goals
- Promote and measure competition between the Utilities
- Trigger an overall improvement in the sector performance

6.1 Performance Analysis

Data used for performance benchmarking is obtained and verified through the consolidated sheet used by the UPMU, who selected AW as the first Utility to be tested against an agreed number of indicators for the year 2019/2020. Miyahuna and the YWC will be considered in future reports. The UPMU and AW considered the following aspects while setting the first batch of performance targets:

- Performance targets should only be for priority areas
- Performance targets should measure real, achievable progress
- The consequences of not meeting performance targets

UPMU staff held several discussions with AW employees to classify indicators into five categories as shown in table 20 below:

<table>
<thead>
<tr>
<th>Nom.</th>
<th>Colour</th>
<th>Group name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green</td>
<td>Performance target should be set</td>
<td>Same target for all Utilities or group of Utilities</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
<td>Performance target could be set</td>
<td>Requires an assessment of individual Utilities, e.g., consideration of investment requirements beyond the Utilities’ capacity, current status of infrastructure, other external factors (e.g., topography)</td>
</tr>
<tr>
<td>3</td>
<td>Yellow</td>
<td>Performance target may not be advisable</td>
<td>Strong dependency on external factors (e.g., investment, policy)</td>
</tr>
<tr>
<td>4</td>
<td>Red</td>
<td>No performance target</td>
<td>Compliance is a legal requirement as targets set by laws and regulators cannot allow laws to be breached</td>
</tr>
<tr>
<td>5</td>
<td>Blue</td>
<td>Performance target for the sector</td>
<td>As an alternative to setting the green category, it might make sense to set sector targets that are aiming more at signalling to policy makers that more needs to be done in and for the sector to make it sustainable (e.g., NRW, cost recovery)</td>
</tr>
</tbody>
</table>

6.2 Benchmarking PIs

In the first batch of performance targets for AW (benchmarking), 13 out of 53 indicators were selected and defined, and the following targets set for the years 2020-2025:

<table>
<thead>
<tr>
<th>No.</th>
<th>Colour</th>
<th>PI’s</th>
<th>Unit</th>
<th>AW/2019</th>
<th>AW/2020</th>
<th>Trend</th>
<th>Target 2020</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green</td>
<td>New connection efficiency</td>
<td>%</td>
<td>100</td>
<td>100</td>
<td></td>
<td>100</td>
<td>achieved</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
<td>Collection Efficiency [Customers]</td>
<td>%</td>
<td>94.8</td>
<td>88.85</td>
<td></td>
<td>84</td>
<td>achieved</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>Non-Revenue Water</td>
<td>%</td>
<td>36.2</td>
<td>36.95</td>
<td></td>
<td>39</td>
<td>achieved</td>
</tr>
<tr>
<td>4</td>
<td>Red</td>
<td>Employees per 1000 subscribers (W&amp;WW)</td>
<td>No/1000</td>
<td>4.5</td>
<td>4.29</td>
<td>Up</td>
<td>5</td>
<td>achieved</td>
</tr>
<tr>
<td>5</td>
<td>Red</td>
<td>Training per employee</td>
<td>Hour/Employee</td>
<td>26.7</td>
<td>14.05</td>
<td>Down</td>
<td>25</td>
<td>Not achieved</td>
</tr>
<tr>
<td>6</td>
<td>Red</td>
<td>Water consumption per capita (billed residential subscribers)</td>
<td>l/capita</td>
<td>79.5</td>
<td>76.42</td>
<td>Down</td>
<td>80</td>
<td>Not achieved</td>
</tr>
<tr>
<td>7</td>
<td>Green</td>
<td>Operating cost coverage ratio (revenue)</td>
<td>%</td>
<td>124.8</td>
<td>122.04</td>
<td></td>
<td>95</td>
<td>achieved</td>
</tr>
<tr>
<td>8</td>
<td>Green</td>
<td>Delay in accounts receivable</td>
<td>month</td>
<td>6</td>
<td>8.10</td>
<td>Down</td>
<td>7</td>
<td>Not achieved</td>
</tr>
<tr>
<td>9</td>
<td>Green</td>
<td>Electricity costs as percentage of total O&amp;M costs</td>
<td>%</td>
<td>23.9</td>
<td>19.41</td>
<td>Up</td>
<td>20</td>
<td>achieved</td>
</tr>
<tr>
<td>10</td>
<td>Red</td>
<td>Preventive maintenance of pumps</td>
<td>%</td>
<td>2.8</td>
<td>100</td>
<td>Up</td>
<td>100</td>
<td>achieved</td>
</tr>
<tr>
<td>11</td>
<td>Red</td>
<td>Operational well and reservoir meters</td>
<td>%</td>
<td>57.6</td>
<td>57.58</td>
<td></td>
<td>55</td>
<td>achieved</td>
</tr>
<tr>
<td>12</td>
<td>Green</td>
<td>Metering of import and export points</td>
<td>%</td>
<td>100</td>
<td>100</td>
<td></td>
<td>100</td>
<td>achieved</td>
</tr>
<tr>
<td>13</td>
<td>Green</td>
<td>Wastewater coverage</td>
<td>%</td>
<td>86.2</td>
<td>90.48</td>
<td>Up</td>
<td>87</td>
<td>achieved</td>
</tr>
</tbody>
</table>

Table 22: List of indicators used in Benchmarking

This will be considered as a first generation of targets and benchmarks, and will be developed over time. UPMU staff will work closely with Miyahuna and YWC after completing this report to set their targets for years the next five years against data from year 2020 (base year), and work with AW to revise the targets for 2021 – 2025.
Chapter 7

What’s next for the UPMU

Illegal use in YWC water network

7- What’s next for the UPMU

The UPMU’s core activities and responsibilities are now specified after finalizing the operational plan for 2021-2022. The following activities are listed in the UPMU road map:

Step 1
Follow implementation of a sustainable finance plan for the UPMU to cover its expenses, reference the letter to BMZ No. 7/2/9444 dated 29/7/2020.

Step 2
Collect comments and update the excel tool where necessary.

Step 3
Conduct a second-round table discussion for technical and commercial experts to assess Non-Revenue-Water more accurately and agree on methodologies to estimate real/apparent losses.

Step 4
Organize a round-table discussion on internal auditing for the Utilities, WAJ, and other stakeholders.

Step 5
Set performance targets in combination with business planning for Miyahuna and YWC for the next five years, taking 2020 as the base year.

Step 6
Recommend updates on regulations and review the assignment agreements.

Step 7
Develop a concept to support the Utilities in improving data collection.

Step 8
Develop an inspection protocol to validate data.

Step 9
Formulate customer service guidelines and customer orientation.

Step 10
Prepare a financial concept for Utilities based on the results of a financial study which was completed in the middle of 2021, including a review of cost recovery, scenario analyses, and required subsidies.

Step 11
Develop a concept of incentives and penalties for the Utilities on the quality of service-delivery and implementation enforcement.

Step 12
Ensure that Utilities have emergency plans in place, which are aligned with the water sector plan.

Step 13
Organize a procedure for peer knowledge exchange between the Utilities on best market practices.

See annex VI UPMU Operational Plan 2021-2022
Annex I Map of Jordan showing the Utilities’ service areas

Annex II List of indicators used in reports for years 2019/2020

<table>
<thead>
<tr>
<th>Ser.</th>
<th>Sections</th>
<th>PI Name</th>
<th>Unit</th>
<th>Miyahuna 19/20</th>
<th>AW 19/20</th>
<th>YWC 19/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Microbiological water quality</td>
<td>%</td>
<td>99.9</td>
<td>99.7</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Water quality tests performed</td>
<td>%</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Physical-chemical water</td>
<td>%</td>
<td>99.8</td>
<td>99.9</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Effluent quality compliance</td>
<td>%</td>
<td>99.4</td>
<td>99.3</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Energy Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Average unit energy consumption</td>
<td>KWh/m²</td>
<td>3.4</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Power consumption monitoring</td>
<td>%</td>
<td>81.9</td>
<td>43.1</td>
<td>0.0</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Speed of repair of failures of</td>
<td>%</td>
<td>96.6</td>
<td>95.9</td>
<td>100.0</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Preventive maintenance of</td>
<td>%</td>
<td>100.0</td>
<td>97.3</td>
<td>2.8</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Corrective maintenance of</td>
<td>%</td>
<td>80.9</td>
<td>21.3</td>
<td>NA</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Sizing of pumps</td>
<td>%</td>
<td>87.9</td>
<td>80.1</td>
<td>0.0</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Bulk Metering</td>
<td>%</td>
<td>100.0</td>
<td>89.9</td>
<td>57.6</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Calibration of well and</td>
<td>%</td>
<td>0.0</td>
<td>35.7</td>
<td>0.0</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>reservoir meters</td>
<td>%</td>
<td>100.0</td>
<td>100</td>
<td>100.0</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Water Loss</td>
<td>%</td>
<td>38.7</td>
<td>46.1</td>
<td>36.2</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Non-Revenue Water</td>
<td>m³</td>
<td>0.35</td>
<td>0.4</td>
<td>0.61</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Water loss per subscriber</td>
<td>m³</td>
<td>25.5</td>
<td>25.46</td>
<td>25.5</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Water loss per mains length</td>
<td>m³</td>
<td>1.25</td>
<td>1.16</td>
<td>0.62</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>Inefficiency of use of water</td>
<td>%</td>
<td>12.5</td>
<td>19.8</td>
<td>18.1</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Network Efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19 Miyahuna Indicators for Amman only
### Customer Service

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity of supply</td>
<td>% of time</td>
<td>Equation 1</td>
</tr>
<tr>
<td>Water consumption per capita (residential subscribers)</td>
<td>Ltrs/capita/day (ltd)</td>
<td>Equation 2</td>
</tr>
<tr>
<td>Subscribers receiving continuous supply</td>
<td>%</td>
<td>Equation 3</td>
</tr>
<tr>
<td>New connection efficiency</td>
<td>% of requests</td>
<td>Equation 4</td>
</tr>
<tr>
<td>Percentage of inactive subscribers</td>
<td>%</td>
<td>Equation 5</td>
</tr>
<tr>
<td>Subscriber meter replacement ratio</td>
<td>%</td>
<td>Equation 6</td>
</tr>
<tr>
<td>Meter reading ratio</td>
<td>%</td>
<td>Equation 7</td>
</tr>
<tr>
<td>&quot;No Water&quot; complaints per 1,000 subscribers</td>
<td>No. of complaints/1000 active subscribers</td>
<td>Equation 8</td>
</tr>
<tr>
<td>Billing complaints</td>
<td>No. of complaints/1000 active subscribers</td>
<td>Equation 9</td>
</tr>
</tbody>
</table>

### Financial

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Efficiency (Customers)</td>
<td>%</td>
<td>Equation 10</td>
</tr>
<tr>
<td>Ratio of total O&amp;M costs</td>
<td>%</td>
<td>Equation 11</td>
</tr>
<tr>
<td>Delay in accounts receivable</td>
<td>months</td>
<td>Equation 12</td>
</tr>
<tr>
<td>Operating cost coverage (Collection)</td>
<td>%</td>
<td>Equation 13</td>
</tr>
<tr>
<td>Operating cost coverage ratio (Collection)</td>
<td>%</td>
<td>Equation 14</td>
</tr>
<tr>
<td>Operating cost coverage ratio (billing)</td>
<td>%</td>
<td>Equation 15</td>
</tr>
<tr>
<td>Unit Profitability (JOD/m³)</td>
<td>JOD/m³</td>
<td>Equation 16</td>
</tr>
<tr>
<td>Operating cost water and wastewater</td>
<td>JOD/m³</td>
<td>Equation 17</td>
</tr>
</tbody>
</table>

### Human Resources

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees per 1,000 subscribers (MBWW)</td>
<td>No/1000 subscribers</td>
<td>Equation 18</td>
</tr>
<tr>
<td>Employees per 1,000 subscribers W</td>
<td>No/1000 subscribers</td>
<td>Equation 19</td>
</tr>
<tr>
<td>Training per employee</td>
<td>Hour/Employee</td>
<td>Equation 20</td>
</tr>
<tr>
<td>Percentage of staff trained</td>
<td>%</td>
<td>Equation 21</td>
</tr>
</tbody>
</table>

### Annex III Calculation of indicators used in this report

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Definition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>&quot;No water&quot; complaints per 1000 subscribers</td>
<td>Number of &quot;no water&quot; complaints per 1000 active subscribers during reporting period</td>
<td>=Complaints of &quot;No Water Supply&quot;/ (Active subscribers/1000)</td>
</tr>
<tr>
<td>Average unit energy consumption</td>
<td>Electricity consumption per m³ supplied</td>
<td>=Electricity production / (Water produced + Imported treated water - Exported treated water)</td>
</tr>
<tr>
<td>Average water and wastewater revenue for billed consumption</td>
<td>Water and wastewater sales revenue from residential and non-residential subscribers (exported water excluded) per m³ of authorized consumption</td>
<td>(Residential water sales amount + Non-residential water sales amount + Billing for illegal usage + Reductions in billing) - Billing for tankers sales - Billing for residential wastewater - Billing for non-residential wastewater - (Residential billed volume + Non-residential billed volume + Volume billed for illegal usage + Volume provided through tankers)</td>
</tr>
<tr>
<td>Billing complaints</td>
<td>Average number of billing complaints and queries per 1,000 water subscribers during reporting period</td>
<td>=Billing complaints / Total water subscribers</td>
</tr>
<tr>
<td>Collection Efficiency (Customers)</td>
<td>Percentage of revenues collected from residential and non-residential customers during period</td>
<td>= (Collected amount from bills of residential &amp; non-residential customers + collected amounts from almsud sewerage agreement) / (Amount billed in Period - billed amount for exported water - Other Billing)/100</td>
</tr>
<tr>
<td>Continuity of supply</td>
<td>Percentage of hours when the (interruption supply) system is pressurized</td>
<td>=Number of hours per week that the system is pressurized / (7*24)*100</td>
</tr>
<tr>
<td>Corrective maintenance of pumps</td>
<td>Percentage of pumps fixed by corrective maintenance</td>
<td>=Production and distribution pumps corrective maintenance / Production and distribution pumps *100</td>
</tr>
<tr>
<td>Delay in accounts receivable</td>
<td>Accounts receivable at reporting date compared to revenues during reporting period</td>
<td>=Total accounts receivable / (Amount billed in period / 12)</td>
</tr>
<tr>
<td>Effluent quality compliance</td>
<td>Percentage compliance of effluent quality test results with standards</td>
<td>=Compliant effluent quality tests / Wastewater effluent tests conducted * 100</td>
</tr>
<tr>
<td>Electricity costs as percentage of total O&amp;M costs</td>
<td>Electricity costs as percentage of total Operation and Maintenance costs</td>
<td>=Total electricity costs / Total operation and maintenance costs water and wastewater services * 100</td>
</tr>
<tr>
<td>Employees per 1,000 subscribers</td>
<td>Number of full time equivalent employees per 1000 water subscribers and wastewater subscribers</td>
<td>=Total number of employees / (Total water subscribers + Total sewer subscribers)/1000</td>
</tr>
<tr>
<td>Employees per 1,000 subscribers W</td>
<td>Number of full-time equivalent employees per 1000 water subscribers</td>
<td>=Total number of water employees / (Total water subscribers + Total sewer subscribers)/1000</td>
</tr>
<tr>
<td>Inefficiency of use of water resources</td>
<td>Real losses during the assessment period / System input volume during the assessment period *100</td>
<td>= (Water produced + Imported treated water - Exported treated water - Billing for illegal usage) / (Water produced + Imported treated water) * 100</td>
</tr>
<tr>
<td>Meter reading ratio</td>
<td>Percentage of active customers whose meter has been read during reporting period</td>
<td>=Customer meters read / Active subscribers *100</td>
</tr>
<tr>
<td>Measuring of import and export points</td>
<td>Percentage of mated import and export points</td>
<td>=Number of metered import points + Number of metered export points / (Number of import points + Number of export points) * 100</td>
</tr>
<tr>
<td>Microbiological water quality compliance</td>
<td>Percentage of the total number of microbiological tests of treated water performed that comply with the applicable standards.</td>
<td>=Compliant microbiological tests/Total microbiological water quality tests performed * 100</td>
</tr>
<tr>
<td>New connection efficiency</td>
<td>Percentage of connections installed within the specified target time</td>
<td>=New water connections type 1 and type 2 within a target time / New water connections type 1 and type 2 required * 100</td>
</tr>
<tr>
<td>Non-Revenue Water</td>
<td>Percentage of system input volume not being billed</td>
<td>= (Water distributed - Billed authorized consumption) / (Water distributed) *100</td>
</tr>
</tbody>
</table>
Operating cost coverage ratio (billing) = Total billing compared to total operation and maintenance costs * 100

Operating cost coverage ratio (collection) = Total collection compared to total operation and maintenance costs * 100

Operating cost coverage ratio (revenues) = Total revenues compared to total operation and maintenance costs * 100

Operational well and reservoirs percentage = Number of wells and reservoirs with operational meters / Number of metered reservoirs

Percentage of inactive subscribers = Percentage of subscribers inactive at the time of reporting / Total water subscribers * 100

Percentage of staff trained = Total number of staff that participated in internal or external training / Total number of employees (full-time equivalent) * 100

Physical-chemical water quality compliance = Number of physical-chemical tests of treated water performed that comply with applicable standards / Number of physical-chemical water quality tests performed * 100

Power consumption monitoring = Production and distribution pumps monitored / Production and distribution pumps * 100

Preventive maintenance of pumps = Production and distribution pumps preventive maintenance / Production and distribution pumps * 100

Renewable energy utilisation = Renewable energy produced / (hydro power produced + wind energy produced + biogas energy produced + electricity consumption) * 100

Sizing of pumps = Production and distribution pumps sizing / Production and distribution pumps * 100

Speed of repair of failures = Network failures repaired in target time / Service connection failures repaired in target time + Network failures + Water service connection failures * 100

Subscriber meter replacement ratio = Subscribers receiving continuous supply / Total water subscribers * 100

Subscriber meters replaced during reporting period = Subscriber meters replaced during reporting period / Total number of training hours in reporting period

Training per employee = Total number of training hours in reporting period / Total number of employees

Unit operating cost water and wastewater services per m³ authorized consumption = Total operation, maintenance and administration costs water and wastewater services / Authorized consumption

Water consumption per capita (residential subscribers) = Average daily water consumption per capita / Residential billed volume / Population supplied (water) * 100

Water loss per subscriber = (Water supplied / Total water subscribers) - (Imported treated water / Total water subscribers) / Population supplied (water) * 100

Water losses per connection per day = (Water supplied / Total connections) / Population supplied (water) * 100

Water quality tests performed = Water quality tests performed / Water quality tests required * 100

Water resources use per capita/day = (Water produced + Imported treated water - Exported treated water) / (Resident population) * 100

Annex IV UPMU 1st NRW roundtable discussion report
First NRW Round Table Discussion 21.06.2021

H.E the minister addressed the workshop with a short speech.

Engineer Mohamed El-Najjar, The Minister of Water and Irrigation, stressed the need to do more work and intensify efforts and procedures to reduce water loss, particularly the need to adopt unified concepts for measuring water loss, and pointed out that Jordan is considered one of the poorest countries in the world in terms of water and is experiencing exceptional conditions this summer.

Eng. Al-Najjar highlighted the role of Jordanian citizens, partners, all civil society institutions, and the private sector in the systematic and thoughtful work to take more actions and measures to reduce Water wastage and unify the concepts of its calculation in Water Utilities according to a scientific basis.

These comments came during H.E. the minister’s sponsorship and opening of the workshop that was held on Monday, 21st June 2021 at Amman Rotana Hotel under the title “Water Loss, Finding Appropriate Solutions and Unifying the Concepts of Calculating Loss in Water Facilities”, which was organized by the Utilities Performance Monitoring Unit (UPMU) in coordination with the German Agency for International Cooperation (GIZ), in the presence of His Excellency the Secretary General of the Water Authority, Eng. Ahmed Alimat, The CEO of Miyahuna, the Director General of the Aqaba Water Company, and a number of specialists and experts in water loss management and customer services in companies and the Head of the NRW unit at the Water Authority.

Dr. Ahmad Al-Azzam, Director of the UPMU, pointed out the need to unify efforts to come up with useful recommendations and results to reduce water losses, which will lead to enhancing the quantities of water distributed to the citizens of Jordan. He also reflected on the need to improve performance and provide optimal services.

Mr. Nayef Hammad, representing the GIZ, noted that this and subsequent workshops are the result of the recommendations and results presented in the Utilities’ performance evaluation report for 2019, and that the GIZ will not hesitate to continue supporting the water sector and qualifying staff (cadres).

Several working papers were presented during the workshop, followed by discussions between the participants and the dialogue organizers, engineers Waleed Sukkar and Zeyad Shawagfeh, through which the participants exchanged knowledge and experiences in the areas of water loss reduction (NRW). It is mentioned that, based on the follow-up and evaluation of the Water Utilities’ performance and motivating them to make more efforts to develop their performance and in implementation of Recommendation No. (9) contained in Performance evaluation for 2019 and in cooperation with the (GIZ), the Utilities Performance Monitoring Unit (UPMU) will hold several workshops to discuss and standardize concepts, exchange experiences, transfer knowledge, and follow and identify optimal ways of reducing technical and administrative losses from water (NRW).
Several working papers were submitted to the workshop by Miyahuna, Aqaba, Yarmouk, the NRW and FARA project unit-WAJ, GIZ, and the consultant. All presentations will be attached as a part of the report.

**Miyahuna working paper.**

The presentation discussed two main subjects; projects that are financed by donors and the strategic plan for Miyahuna.

1. Projects financed by USAID
   a. FARA Phase I-Distribution Zones. Includes 86 DMAs & 157,034 Customers
   b. FARA Phase II-Distribution Zones. Includes 116 DMAs & 169,632 Customers
   c. FARA 07; Bulk meter replacement 10,000, & the replacement of 44,000 customer meters.
   d. Phase II FARA 07; IT Infrastructure Upgrade

2. Strategic Plan
   a. DMA Management, Monitoring and Controlling / Data Acquisitions, Network Rehabilitation Programs
   b. Reduce Commercial Losses
   c. Capacity Building
   d. Private Sector Participation to reduce NRW

3. Main project components Amman, Zarqa and Madaba.
   a. Establish smart platform for Metering, Monitoring and Controlling in Miyahuna, integrating the AMI, SCADA, and ERP systems
   b. Improve Metering, Monitoring, and Operation for the Primary Water Supply System in Amman and Parts of Zarqa and Madaba
   c. Smart operation for secondary water supply system in Khilda Distribution Zone (DZ13) in Amman, improve metering, monitoring, and operation for tertiary water supply system in selected DMAs inside DZ 13, simulating the continuous supply in DZ 13 DMAs
   d. Replacement of Big Customers’ meters
   e. Replacement of Bulk Meters

**Aqaba Water Co. working paper**

The presentation clarified the strategic plan to reduce NRW from 36% in 2019 to 24% by 2024 through the following measures

1. Establishing NRW Unit
2. Replacing Customer Meters
   a. Replace 36,000 mechanical meters with Ultrasonic flow meters over 4 phases
   b. Implement an AMI / AMR System
   c. Conduct NRW Calculations before and after the meter Replacement
   d. Analyze the Results and calculate the impact on NRW %

3. SCADA Upgrade Project
   a. NRW calculation over the entire water system from Disi Well Field to the DMZ.
   b. Using HART protocol to ensure high accurate flow and Totalizers Readings
   c. Cover all AW company sites (Total 111 sites)
   d. Integrate with AMI, Noise loggers, Pressure Management system, & ERP system
   e. Energy Efficiency Management System with Power Monitoring system

4. Public Private Sector Participation Contract (PPPC)
   a. Cross Connection, Illegal Connection, and Leak Detection Survey
   b. Noise Loggers and Leak Detection Equipment’s supply
   c. AW staff Training

**Yarmouk working paper**

The presentation detailed the strategic plan and projects to reduce NRW from 49.5% to 40%.

1. Strategic Plan;
   a. Establishing NRW Unit to cover all Yarmouk Water Company
   b. Reduce commercial losses
      • Improve customer water meter reading, install smart meters (3,500 WM’s), and detect Illegal usage
   c. Reduce physical losses
      • FARAI project to provide 2 full equipped mobile units (Fincanced by USAID), Survey Main and Distribution water network, and Establish DMAs

2. Projects to reduce NRW;
   a. Rehabilitation and replacement of Network, financed by KfW, AFD, EU (2021-2023)
   b. Rehabilitation and replacement of Network at Irbid and Ramtha, financed by WAJ (2022-2024)
   c. Rehabilitation and replacement of Network at Irbid and Ajloun, financed by USAID (2021-2023)
   d. HC replacement at Hwarah and Sareeh, financed by JICA (2021-2022)
   e. Rehabilitation and replacement of the Network in different areas of the entire company, financed by the Jordanian Government.

**NRW and FARA Projects Unit working paper**

The presentation explains the strategic plan for the NRW Unit and Project Monitoring and following up on the implementation of NRW activities across the whole of Jordan.

1. Strategic plan
   The unit is currently working to establish NRW reduction strategy with all related parties
(Utilities, Directorates). This will cover all necessary components of NRW to ensure that the proposed strategy is feasible. Meanwhile, its aim is to shorten the time taken to identify, locate and repair leaking infrastructure to minimize water losses, and to be integrated in the day-to-day business processes.

2. NRW Reduction and FARA projects unit- Main projects;
   • NRW Phase II- Associate FARA 4 USAID. The project activities are divided into four main parts ($15,500,000):
     a. Restructuring, Rehabilitation, Residential Water Meters, and Pressure Management of Ain Al-Basha
     b. Mobile Leak Detection Workshops
     c. Shoubak Pump Station (Najel)
   • FARA NRW - Phase III: $ 152,000,000: September 1, 2020 to August 31, 2026
   • KFW with amount approximately 50-60 million Euros
   • IFC with approximate financing amount up to 60 $ million

**GIZ working paper (Mafraq pilot project)**

The main Goal of the presentation is NRW reduction through implementing a Sustainable Zone-NRW management approach in the YWC.

Main approach:
- NRW-Zone Identification (commercial-technical): Install metering points / bulk metering points, identify accurate zone boundaries with Improvement.
- Implementation of the YWC-GIZ-Framework contract: replacement of water network and damaged water meters
- Knowledge transfer and Sustainability of Zone-NRW management installed approach:

Activities and Achievements:
- MAFRAQ Pilot Project:
  - Registration of 3500 customers, Replacement of 1600 water meters, and Discovery of 600 illegal cases.
  - Billed Amount (M3) increased by 31%, (from 5.5 to 7.2 Mio M3)
  - Collected amounts (JOD) increased by 100%, (from 1.9 to 3.8 Mio JOD)
- Yarqa Pilot Project at Balqa WA: reduction of NRW from 60.3% to 34.7% by management of water meters

**UPMU working paper**

The presentation elaborates the UPMU Variables and Indicators related to-Non-Revenue Water.
- The main objective is standardizing the definition of water supplied as water distributed minus water exported, which is equal to water produced plus water imported.
- PI’s related to NRW: there are 6 indicators which have a direct input on NRW and more than 10 indicators that have indirect inputs related to NRW
- The formula for calculating the NRW% is: water distributed minus water billed divided by water distributed

**Consultant working paper, containing two presentations:**

1. General approach towards NRW
   - The impact of negative and positive input components on NRW;
   - Increased NRW decreases the revenue, increases customer demand and budget for operation decreased. On the other side any decreased in NRW this will have positive impact on the revenue, the budget of operation and more investment on NRW reduction.
   - IWA Water Balance Calculation and the UPMU WB structure
2. Technical Approach towards NRW (Case Study by Japanese Consultant -Miyahuna/Amman)
   - Four pilot areas were selected (Jofeh, Suewileh, Jubieha, and Tareq)
   - NRW management through DMA
   - Reduction of Commercial losses, Detection of defective customer meters, Replacement, and Rotated meter’s accuracy test
   - Reduction of Physical losses by Leak Detection Approach

**Recommendation for second round table discussion**

Subjects to be tackled
1. Percentage of NRW (Commercial & physical losses)
2. Minimum Night Flow
3. Pressure Management
4. ILI calculation
5. Utilities Contribution (Case Studies to be Provided)
6. The NRW strategies in the Utilities Business Plans (BP’s)
7. Any other related issues
Annex V Memorandum of Understanding (MoU)

Memorandum of Understanding (MoU)

The Jordan Water Authority (JWA), Jordan Water Company (JWC), and Mabubeh Company (MBC) hereby agree to cooperate in the field of water management, water supply, and water distribution.

The parties agree to:

1. Share information on water resources, water demand, and water quality.
2. Collaborate on the development of water projects.
4. Establish a joint committee to oversee the implementation of the MoU.

This MoU is effective from [Date] and shall continue for [Duration].

[Signatures]

[Company Names]
3. Joint Activities

To achieve the objectives of the cooperation, the Partners intend to implement the following joint activities:

**a) Cooperation in the area of on-boarding of new employees**

The aim of on-boarding is to provide new employees with the necessary information and create a sense of belonging to the company.

**b) Knowledge Management**

The targeted outcome of this activity is an active interdepartmental exchange of staff and different levels in the sector, to identify synergies within water-related topics as well as staff motivation.

**c) Job shadowing**

Job shadowing could be conducted in the same water company or between sector companies, e.g., someone from VWC could shadow someone from Miyahuna in the area of training in order to learn from them.

**d) Mentoring**

To learn from WAD experience in setting mentoring matrices.

**e) Alignment of a competency framework for common areas based on what already exists.**

**f) Participation and presentation of results and impacts at international conferences**

The intended outcome of this activity is an active interdepartmental exchange of knowledge and staff motivation.

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UNWA, in cooperation with the partners, will organize exchange of experiences according to the needs of work and between all parties in the following areas, including but not limited to:

- Management of water losses.
- IT systems and tools for all purposes.
- Energy efficiency and renewable energy.
- Financial and accounting management.

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The affiliation of the cooperation is conducted within the framework of the Jordan Water Utilities Monitoring Report - 2020.
4 Modalities of the Collaboration

- WAJ will act as a facilitator for the implementation of the joint activities.
- Utilities Performance Monitoring Unit (UPMU) will coordinate activities as per its mandate.
- UPMU will organise an annual event to review the year’s activity and planning for the next year.
- All partners jointly will support the implementation of the activities by: leading, participating, coordinating or providing logistics.

4.1 Partners will appoint a coordinator who will be responsible for ensuring the smooth preparation of the joint activities and keeping alive the flow of communication between the Partners:

- For WAJ: (main coordinator) Director of Training and Capacity Building Directorate.
- For Aguab: Director of Human Resources and Training.
- For Mihana LLC Water Company: Head of the Learning and Development Division - under the supervision of the Director of the Human Resources Department.
- For Yarmouk: Human Resources Manager.

4.2 The Partners will share information and meet regularly in order to consult on the progress of the Cooperation:

Once, every quarter of a year face to face or by video conference.

5 Team

This MoU becomes operative on the date of signature and remains in force for three years.

6 Non-binding Nature

Nothing in this MoU shall be understood or construed as a binding right or obligation of the Partners or as obligating the undersigned Partners hereby to finally conclude any agreement. In particular, this MoU is in no way to require either Partner from pursuing similar activities on its own or from participating in similar activities with other public or private agencies, organizations, and individuals and shall not provide exclusivity between the Partners in the scope of any cooperation, does not endorse a specific entity, does not create any rights in any person, and does not create any obligations for any third party.

This MoU is drawn up in four originals.

Page 5
## Annex VI UPMU Operational Plan 2021-2022

### UPMU Workplan June 2021 - May 2022

<table>
<thead>
<tr>
<th>Task</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
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<tbody>
<tr>
<td>1. Draft Report by the director</td>
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<td>2. Send report to the board</td>
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<td>3. Follow up with the board</td>
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<td>4. Send report to the media</td>
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### Diagram

- Diagram A: [Diagram A Image]
- Diagram B: [Diagram B Image]
Utilities Performance Monitoring Unit (UPMU) Team

Dr. Ahmad Abdellatif Al-Azzam
Utilities Performance Monitoring Unit Director

Frauke Neumann-Silkow
Director of GIZ water portfolio

Hussein Mohamad Al-Sorkhy
Accounting & Financial Monitoring Expert

Jamal Mohammad Dajani, CPA
Financial/Economic Expert

Nayef Khalil Hammad, MBA
National Component Manager - Regulation and Private Sector Participation

Eng. Jamal Issa Al-Nasr
Utilities Operation Expert

Eng. Zeyad Abdelrahman Shawagfeh, MBA
Senior Technical Expert - Water Sector

Nayef Neammar-Silksom
Director of MEA Water and Reuse

Eng. Zayed Abdulrahman Shawkat, MBA
Senior Technical Expert - Water Sector

Hussein Mohamad Al-Sorkhy
Accounting & Financial Monitoring Expert

GIZ Water Portfolio Jordan - Management of Water Resources II