



**The Hashemite Kingdom of Jordan**  
**Ministry of Water and Irrigation**

**Structural Benchmark**  
**Action Plan to Reduce Water Sector Losses**

**First Revision**

**October 2016**

## Table of Contents

|  |    |
|--|----|
| EXECUTIVE SUMMARY .....                            | 1  |
| RISKS .....  | 2  |
| CONCLUSION .....                                   | 2  |
| 1.0 INTRODUCTION .....                             | 3  |
| 2.0 CURRENT SITUATION .....                        | 4  |
| 2.1 Billed Water and Non-Revenue Water (NRW) ..... | 4  |
| 2.2 Current Water Tariff .....                     | 6  |
| 2.3 Effect of Electricity Tariff Increase .....    | 7  |
| 2.4 O&M Cost Recovery Current Situation .....      | 9  |
| 2.5 Syrian Refugee Effect .....                    | 9  |
| 3.0 ACTION PLAN .....                              | 10 |
| 3.1 Revenue Improvement .....                      | 12 |
| 3.2 Cost Reduction .....                           | 12 |
| 3.3 Effect of Action Plan on Loss Reduction .....  | 15 |
| 3.4 Improvement of operating ratio .....           | 16 |
| Annexes .....                                      | 17 |

## ***List of Figures***

|   |    |
|---|----|
| Figure 1 Total Billed Quantities (MCM) .....                    | 5  |
| Figure 2 NRW % Reduction plan.....                              | 5  |
| Figure 3 Historical & Future Electricity Costs (, 000 JOD)..... | 8  |
| Figure 4 Refugee impact on power consumption in YWC .....       | 10 |
| Figure 5 Effect of Action Plan on WAJ Revenues (1000 JOD).....  | 14 |
| Figure 6 Effect of Action Plan on WAJ O&M Cost .....            | 14 |
| Figure 7 O&M cost coverage.....                                 | 15 |
| Figure 8 Development of operating ratio.....                    | 16 |

## ***List of Tables***

|  |    |
|--|----|
| Table 1 Current Tariff for Governorates operated by WAJ.....                           | 6  |
| Table 2 Current Tariff for Governorates operated by Companies (Miyahuna, YWC, AW)..... | 6  |
| Table 3 Non-Residential Tariff.....  | 6  |
| Table 4 Current Tariff revenues.....   | 7  |
| Table 5 Electricity Tariff Increases for Water Pumping .....                           | 8  |
| Table 6 Planned Actions.....   | 13 |

## EXECUTIVE SUMMARY

The first “Structural Benchmark Action Plan to Reduce Water Sector Losses” was implemented in parts between 2013 - 2015 and turned a negative downward trend around, with positive developments on the revenue side and regaining control on the operations management after the heavy impact of the Syrian refugee crisis, which reduced the operating ratio from a positive 110% in 2010 to 80% in 2015.

The broadened preparatory basis and the lessons learned out of the first Action Plan enabled the Ministry of Water and Irrigation (MWI) to now present a more realistic first revision, incorporating donor projects and reducing implementation risks considerably.

Key intervention areas like energy efficiency and securing cost efficient energy supply using renewable sources are already in the implementation phase and adequate funding has been secured to enhance activities.

The other main problem area is the persistently high Non-Revenue-Water percentage of more than 50%. In this planning period, a paradigm shift will take place and a new mix of related activities has been included in the revised Action Plan. Salient features of the planned activities and projects are the orientation on both components of NRW, i.e. real and apparent losses and the introduction of performance based contracting, supported by Technical Assistance projects of several international development agencies.

Nevertheless, considerable investment is needed to reinforce water and wastewater systems to cater for the sudden population increase of more than 30% in some service areas. The planned projects as proposed in the Jordan Response Plan (JRP) must be funded and the international donor community needs to commit the required resources.

The proposed actions to increase the revenue basis are primarily focusing on segments of the population able to pay and shall protect the socially weak part of the population. Therefore, no tariff increase shall be applied on the lowest block of the tariff, i.e. the consumption between 0 – 18 cbm/quarter.

Most challenging will be the introduction of performance based activities in the present institutional environment, which needs to be enforced and requires quite a series of difficult and unpopular decisions. The still limited role of the Jordanian private sector in operation and maintenance of water supply and wastewater disposal systems will have to be expanded, as the limited resources on qualified personnel in the water sector institutions will as well limit the successful implementation of projects and actions foreseen in this plan.

This plan has been developed in such a way, that it can be monitored easily and in a transparent way, as it is embedded in the regular business activities. It shall be integrated with planned and ongoing donor activities and will be driven by the overall needs of the Jordanian water sector.

## RISKS

Major risks and prerequisites for achieving the planned targets are as follows:

- Geo-political developments in the area affecting Jordan, in particular the Syrian crisis;
- Availability of required investments for the water sector as well as refugee support under the JRP in a timely manner;
- Increases to electricity tariffs beyond 2015 levels;
- Effective coordination of Technical and Financial Assistance projects and programs; and
- Implementation capacity of the water companies can afford implementing the plan and engagement of the Jordanian private sector in O&M.

## CONCLUSION

The first Action Plan was developed in a period of crisis, when refugees from Syria and other countries entered Jordan in big numbers and the cost of electricity went beyond sustainable levels for the water sector agencies. A number of actions defined in this first plan could not be executed due to financial constraints, and the water sector operating in crisis mode.

This first revision is based on a much better basis with most of the required funding secured and decisions taken and thus has high probability to be implemented successfully and reaching the O&M cost recovery as planned in 2020. Nevertheless, a margin of error in the range of 3 % has to be considered.

External factors like tariff increases for electricity and the lack of adequate international support for the refugees hosted by Jordan are the main risks and cannot be influenced by the water sector.

**Therefore, the Ministry of Water and Irrigation will be only committed to operating cost coverage with the action plan under the condition of a fixed electricity tariff (94 fils/kWh) upto 2017, an increase to 100 fils/kWh for 2018/19 and 105 fils/kWh from 2020 onwards for the Water Authority of Jordan and an adequate international support to cover the Syrian refugee direct costs.**

## 1.0 INTRODUCTION

The current costs of providing water are growing and increasingly severe the burden on the nation's finances. Budgetary outlays for the water sector resulted from increased costs caused by increased demand due to fluxes of refugees, electricity tariff increase, increased population, and the unwillingness to recover those costs from existing or new water users through tariff increases. With projected population growth, and with uncertain economic prospects in the region over the coming decade, the harsh fiscal climate in Jordan's water sector will certainly get worse unless concrete actions are taken.

The special geographical and hydro geological conditions in Jordan create an extremely difficult operating environment for provision of water supply and wastewater disposal services, such as the following:

- Elevational differences of more than 1,000 meters between sources and consumers;
- Long transmission distances of more than 350 km; and
- Treatment of marginal water sources

Jordanians and the expatriates living in Jordan including the refugees enjoy subsidized water and wastewater services. The International Monetary Fund (IMF) report estimated the Water companies' losses to be 1% of the Gross Domestic Product (GDP).

In May 2013, IMF issued the May 2013 Report "IMF Country Report No. 13/130 Jordan: First Review Under the Stand-By Arrangement, Request for Waivers of Nonobservance of Performance Criteria, Modification of Performance Criteria, and Re-phasing of Access – Staff Report; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Jordan." The report indicated in the Policy Discussions that "the authorities will also start tackling the losses of the water companies", it also identified "bringing the energy and water sectors back to cost recovery" as Structural benchmarks for 2013 which will be supporting the fiscal reform program objectives. The report mentioned that Government of Jordan (GoJ) "will start tackling the losses of the water company". Annual losses could be about one percent of GDP, reflecting inefficiencies (in particular systems losses) as well as problems with revenue collection. The IMF September 2016 Report "Request for an Extended Fund Facility – Press Release; Staff Report; and Statement by the Executive Director for Jordan" pointed out to WAJ's performance which has been severely affected over the last few years by the additional demand from Syrian refugees and increase electricity tariffs. WAJ losses were 1.1 percent of GDP in 2015, partly reflecting higher than expected capital expenditures and borrowing costs. Therefore MWI should publish an updated "Action Plan to Reduce Water Sector Losses by the end of December 2016. MWI will finalize and announce to the public by December 2016 a 1<sup>st</sup> revision of the 2013 action plan on how to reduce the company's losses over the medium term (structural benchmark).

The revised plan aims at analyzing the results of the previous 3 years, identifying and planning the actions and activities needed to achieve O&M cost recovery in the water sector.

## 2.0 CURRENT SITUATION

### 2.1 Billed Water and Non-Revenue Water (NRW)

The main revenue stream to the water companies comes from water sales which depend on water quantities billed and tariff. Both of these need to be improved if to reduce the losses in the water sector.

Whereas the tariff is the most delicate adjustment factor, as it on one hand should enable recovery at least of O&M costs, but on the other hand it has a social dimension and should protect the lower income groups from excessive charges on a basic commodity. This is difficult to reflect in the tariff because of the extreme operational conditions in a water scarce country like Jordan, requiring the transportation of water over long distances and pumping over extreme elevational differences of more than 1,300 metres with high energy inputs. At present the tariff is subsidized by the GoJ and changes require government approval. It should be mentioned here that the right for setting and changing water tariff in Jordan rests with the Cabinet of Ministers, where decisions are taken upon a recommendation of the Minister of Water & Irrigation based on WAJ Board of Directors recommendation.

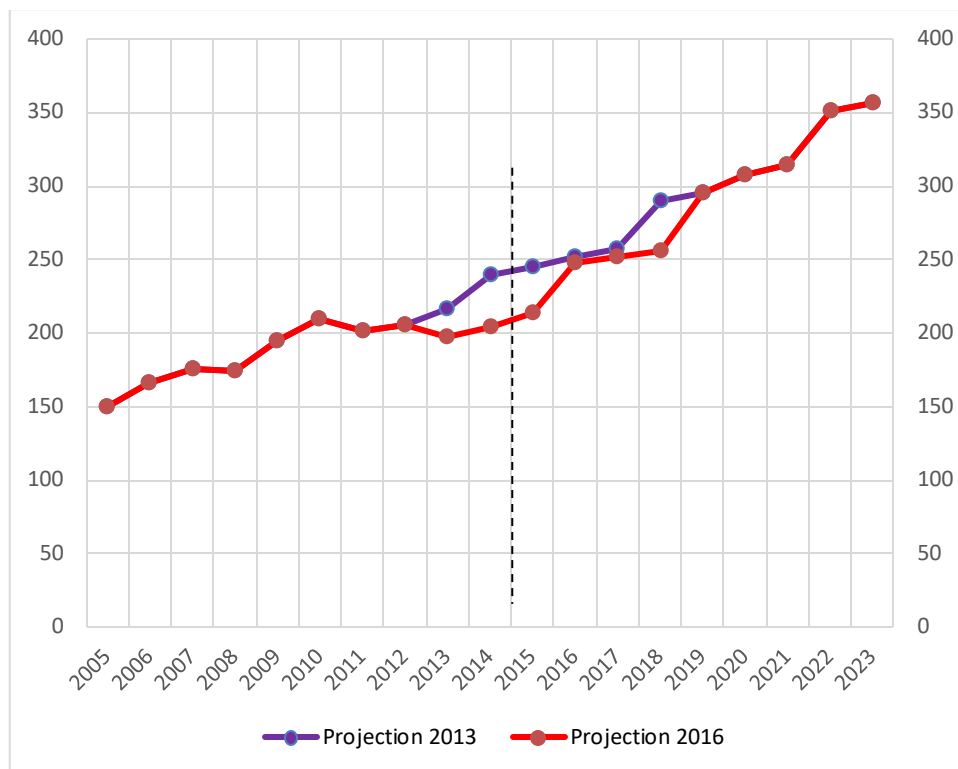
The water quantities billed, however, must be increased as the high percentage of Non-Revenue-Water (NRW), which despite massive investments, stays at persistently high levels i.e. 50% which is not sustainable. A large portion of it can be attributed to internal inefficiencies in customer management, illegal consumption and low performance of staff in the connection, meter reading, billing and collection processes.

Figure 1 below shows the Total Water Billed in (MCM), it also projects the billed quantities for the next 10 years based on planned projects and planned levels of Non-Revenue water (NRW) reduction. The NRW reduction policy targets are shown in Figure 2 below.

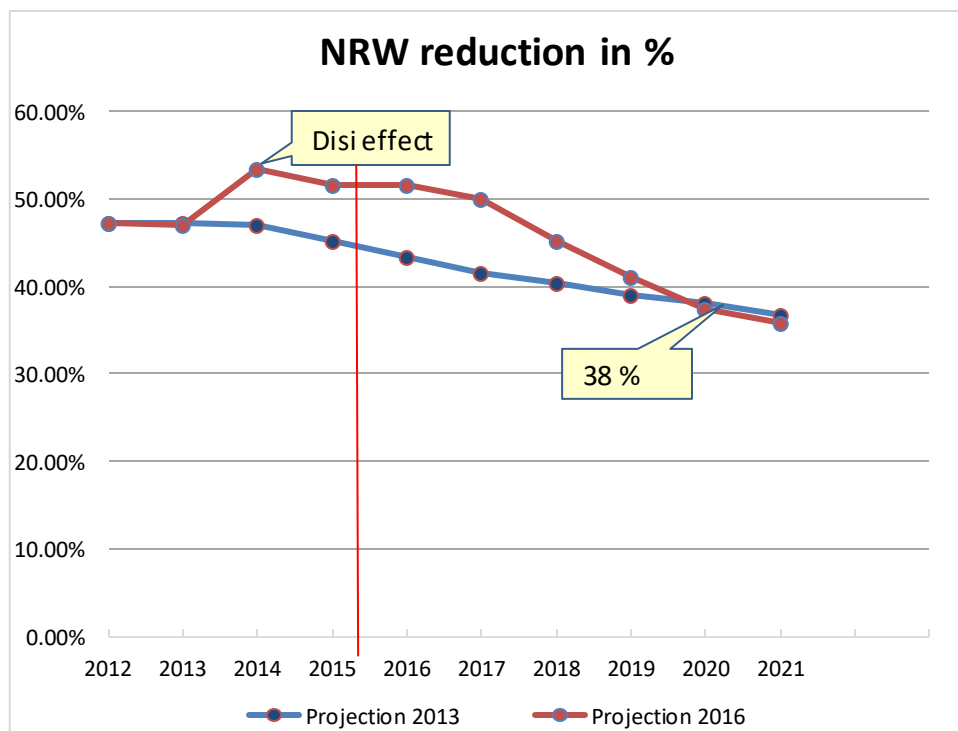
In 2015 the total water produced in WAJ amounted to 441 million m<sup>3</sup>, out of which 227 million m<sup>3</sup> or 51.5% are NRW. The composition between physical and administrative or apparent losses differs across the country, for simplicity reasons it can be assumed the share is about 50% for each component. Whereas the apparent losses indicate a high percentage of illegal consumption, low payment morale and inefficient customer services and metering which primarily relates to managerial deficiencies and can be addressed at relatively low cost, the physical loss reduction requires considerable investments.

Although several programs have been carried out over the past 20 years, the general problem was and is a kind of structural under-investment in the water infrastructure. In Yarmouk Water Company (YWC), for example, several engineering studies during the nineties and the latest one in 2005 identified a required investment volume of more than 250 million JOD for the water supply systems alone, but less than 100 million JOD could be secured.

The JRP envisages an investment volume of more than 750 million USD for three years i.e. 2016-2018, but only about 17% of that amount has been committed by international funding agencies in 2016.



**Figure 1 Total Billed Quantities (MCM)**



**Figure 2 NRW % Reduction plan**



## 2.2 Current Water Tariff

Based on a Council of Ministers Decision of April 1<sup>st</sup> 2012 quarterly billing has been reintroduced.

From 2015 onwards the tariffs have been adjusted. Three different water tariffs are in place: one for governorates operated by the Water Authority of Jordan (WAJ), one for governorates operated by Companies (Miyahuna, Yarmouk Water Company (YWC), and Aqaba Water (AW)) and a third one for non-residential customers.

Table 1, Table 2 and 3 below include the details of the current 2016 tariff, which cannot cover the present and future O&M costs.

**Table 1 Current Tariff for Governorates operated by WAJ**

| Quarterly Block   | Unit Price (JOD) (JOD/ m3 of billed water) |             |             | Cumulative Fixed Charge (JOD/Month) | Adjustment Factor |
|-------------------|--|-------------|-------------|-------------------------------------|-------------------|
|                   | Wastewater Price*                          | Water price | Total price |                                     |                   |
| <b>18 or less</b> | 0.690**                                    | 1.500**     | 2.190**     | 4.430                               | 1.000             |
| <b>19-36</b>      | 0.045                                      | 0.075       | 0.120       | 7.630                               | 1.000             |
| <b>37-54</b>      | 0.230                                      | 0.400       | 0.630       | 9.280                               | 1.000             |
| <b>55-72</b>      | 0.380                                      | 0.715       | 1.095       | 9.280                               | 1.100             |
| <b>73-90</b>      | 0.400                                      | 0.748       | 1.148       | 11.280                              | 1.150             |
| <b>91-126</b>     | 0.660                                      | 1.150       | 1.810       | 11.280                              | 1.150             |
| <b>&gt;126</b>    | 0.970                                      | 1.440       | 2.410       | 11.280                              | 1.200             |

\*: Customer will only pay wastewater charges if connected to the wastewater system

\*\*: Flat Rate

**Table 2 Current Tariff for Governorates operated by Companies (Miyahuna, YWC, AW)**

| Quarterly Block   | Unit Price (JOD)- (JOD/ m3 of billed water) |             |             | Cumulative Fixed Charge (JOD/Month) | Adjustment Factor |
|-------------------|---|-------------|-------------|-------------------------------------|-------------------|
|                   | Wastewater Price*                           | Water price | Total price |                                     |                   |
| <b>18 or less</b> | 0.690**                                     | 2.100**     | 2.790**     | 4.430                               | 1.000             |
| <b>19-36</b>      | 0.045                                       | 0.145       | 0.190       | 8.080                               | 1.000             |
| <b>37-54</b>      | 0.290                                       | 0.500       | 0.790       | 9.730                               | 1.000             |
| <b>55-72</b>      | 0.570                                       | 0.935       | 1.505       | 9.730                               | 1.100             |
| <b>73-90</b>      | 0.795                                       | 1.150       | 1.945       | 11.730                              | 1.150             |
| <b>91-126</b>     | 0.925                                       | 1.610       | 2.535       | 11.730                              | 1.150             |
| <b>&gt;126</b>    | 1.105                                       | 1.920       | 3.025       | 11.730                              | 1.200             |

\*: Customer will only pay wastewater charges if connected to the wastewater system

\*\*: Flat Rate

**Table 3 Non-Residential Tariff**

| Consumption (m3/quarter) | (JOD/Billed water in m3) |                   | Fixed Charge (JOD/Month) |
|--------------------------|--------------------------|-------------------|--------------------------|
|                          | Water Tariff             | Wastewater Tariff |                          |
| <b>0-6</b>               | 7.800**                  | 0.805             | 6.000                    |
| <b>7 and above</b>       | <b>1.300</b>             | 0.865             | 7.800                    |

Revenues collected in 2015 based on the billed quantity of water of 214 MCM and the current tariff was 152.5 Million JOD from water sales and 70.2 Million JOD from Wastewater sales, reaching more than 195% of the unit revenue per cubic meter of 2010, as shown in Table 4 below..

**Table 4 Current Tariff revenues**

| Criteria                               | Unit     | Year    |         |         |         |
|--|----------|---------|---------|---------|---------|
|  |          | 2012    | 2013    | 2014    | 2015    |
| <b>Billed Quantity (MCM)</b>           | MCM      | 182     | 198     | 204     | 214     |
| <b>Water Sales Revenues</b>            | ,000 JOD | 115,177 | 125,547 | 137,280 | 152,551 |
| <b>Wastewater Sales Revenues</b>       | ,000 JOD | 43,678  | 48,942  | 57,453  | 70,208  |
| <b>Total Billing Revenues</b>          | ,000 JOD | 158,855 | 174,489 | 194,734 | 222,759 |
| <b>Average Water Sales Revenue/ m3</b> | JOD/ m3  | 0.633   | 0.634   | 0.673   | 0.713   |
| <b>Average WW Sales Revenue/m3</b>     | JOD/ m3  | 0.240   | 0.247   | 0.282   | 0.328   |
| <b>Average Billing Revenue/ m3</b>     | JOD/ m3  | 0.873   | 0.881   | 0.955   | 1.041   |

Source: WAJ consolidated statements of revenues and expenses

The wastewater tariff was increased by 15% for all customers in governorates operated by WAJ and water companies and non-residential customers, effective from July 1<sup>st</sup>, 2014.

The water tariff was increased for all customers in governorates operated by WAJ and water companies as per the following: 2 JOD for quarterly block 0-18 m3, 4 JOD for quarterly block 19-72 m3 and 6 JOD for quarterly block above 72 m3, an equivalent to about 12% increase, effective October 1<sup>st</sup>, 2015.

**It was decided that any tariff adjustment within the coming three years shall not be applied on the lowest consumption block of 0 -18 cbm/quarter.**

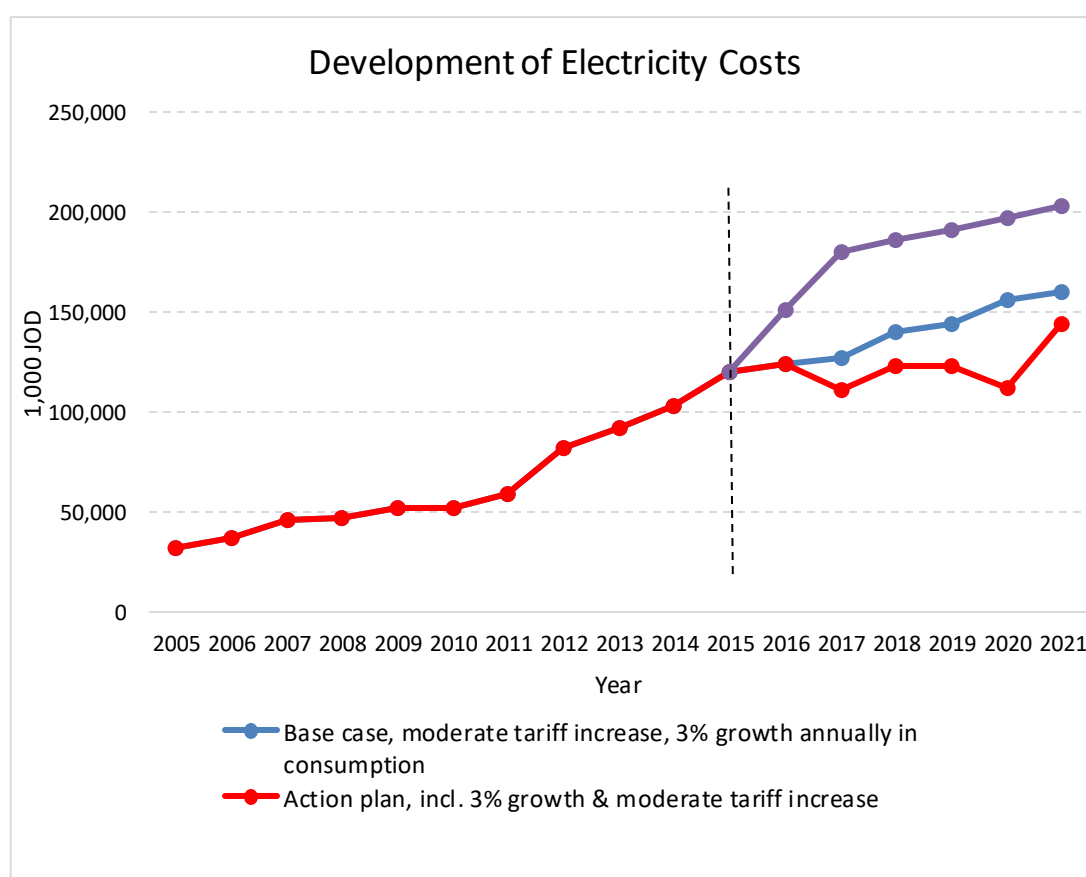
### 2.3 Effect of Electricity Tariff Increase

As part of the reform program, GoJ announced a new electricity tariff reform in which the electricity tariff for water pumping was supposed to be increased by 316% between 2010 and 2017. Due to the lower oil prices the originally planned increases were adjusted to 94 fils/kWh in 2015 and are expected to stay on this level until end of 2017.. It can be expected that the prices will be frozen or only rising slightly over a prolonged period of time, as the development of the oil and gas prices are not expected to show upward trends in the coming 5 years. In the action plan, a rise to 100 fils/kWh from 2018 , and another increase to 105 fils/kWh beyond 2020 has been considered in the action plan.

Furthermore, on account of the growing population, dropping groundwater levels and increasing treatment requirements, a 3% increase in electricity consumption has to be considered and is reflected in Figure 3 below. Should the electricity tariff be increased over the coming years, the disastrous effect is visible in Figure 3, Base case incl. tariff increase.

|                                     | 1 Feb<br>2010 to<br>30 Jun<br>2011 | 1 Jul<br>2011 to<br>28 May<br>2012 | 29 May<br>2012 to<br>14 Aug<br>2013 | 15 Aug<br>2013 to<br>31 Dec<br>2013 | 1 Jan<br>2014<br>to 31<br>Dec<br>2014 | 1 Jan<br>2015 to<br>31 Dec<br>2015 | 1 Jan<br>2016<br>to 31<br>Dec<br>2016 | 1 Jan<br>2017<br>to 31<br>Dec<br>2017 |
|-------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|---------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|
| Planned<br>Increase<br>[Fils / kWh] | 42                                 | 54                                 | 66                                  | 76                                  | 87                                    | 100                                | 115                                   | 133                                   |
| Percentage                          |                                    | 28.6%                              | 22.2%                               | 15.2%                               | 14.5%                                 | 14.9%                              | 15.0%                                 | 15.7%                                 |
| Actual Increase<br>[Fils / kWh]     |                                    | 54                                 | 66                                  | 76                                  | 87                                    | 94                                 | 94                                    | 94                                    |
| Actual Increase                     |                                    | 28.6%                              | 22.2%                               | 15.2%                               | 14.5%                                 | 8%                                 | 0%                                    | 0%                                    |

**Table 5 Planned and Actual Electricity Tariff Increases for Water Pumping**



**Figure 3 Historical & Future Electricity Costs (, 000 JOD)**

Any tariff increase and higher consumption will negatively impact the water sector cost recovery and will increase the operation and maintenance deficit, unless energy efficiency in water pumping is improved and other sources of energy (renewables) will be developed to reduce the dependency from the electricity distribution companies.

## 2.4 O&M Cost Recovery Current Situation

NRW, electricity and personnel are the main O&M cost drivers and to some extent driven by external factors beyond the control of the water sector agencies.

The costs in the curves were calculated using the announced electricity tariff, which at present stands at 94 fils/kWh.

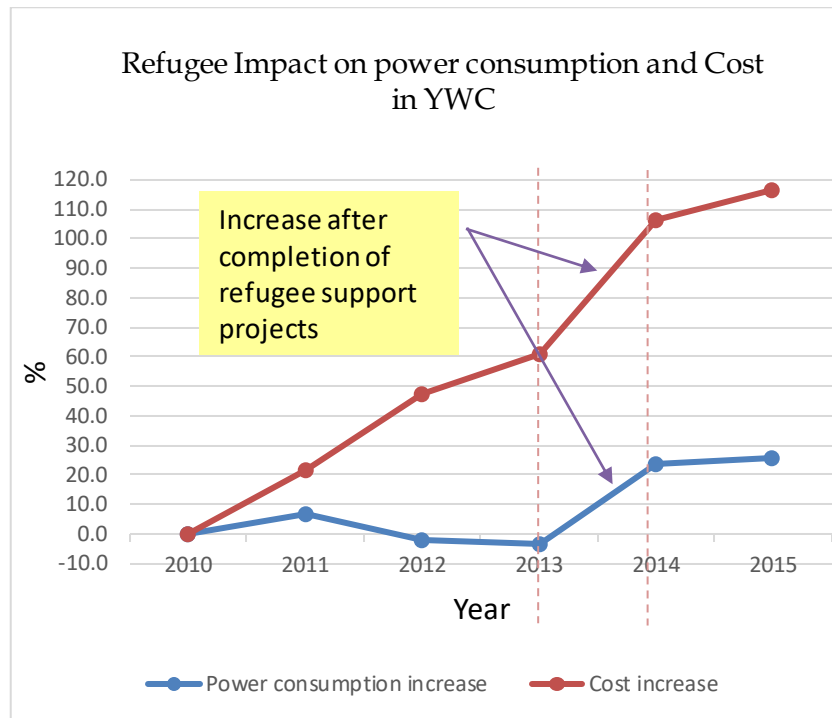
## 2.5 Syrian Refugee Effect

The Syrian refugees forced MWI to increase water production by drilling and rehabilitating wells, reinforce existing water supply systems to provide adequate water to refugees residing outside the camps (85% of refugees). Protection of water resources near camps (Za'atary) had to be undertaken by construction of proper wastewater collection systems. As a lot of new facilities introduced after the crisis are driving the energy consumption up, and the lack of funding for the JRP necessitated the excessive use of energy to pump water in undersized pipelines.

WAJ is under pressure to pursue new capital investments **now** in the range of 100's of million JOD as a result of the Syrian refugee impact that otherwise will be done may be in 7-10 years time. A good example is the 3<sup>rd</sup> expansion of As Samra WWTP, where the 2<sup>nd</sup> expansion has just been completed, but MWI had to start to secure financing for the 3<sup>rd</sup> expansion now.

Figure 4 shows the impact of Syrian refugees on the power consumption and electricity costs in the Northern Governorates which water and wastewater systems are operated by YWC, hosting the majority of the registered refugee population.

In August 2016, MWI updated the report on hosting Syrian refugees cost on the water sector; the report shows that the Direct Short Term O&M cost for 1.266 million refugees living in host communities amounts to 36.1 Million JOD per year while the long-term indirect cost amounts to 207.3 Million JOD per year. The number of registered Syrian refugees increased to 656,400 (2016).



**Figure 4 Refugee impact on power consumption in YWC**

### 3.0 ACTION PLAN

As the GoJ will decide to transfer the capital investment and financing cost including debt servicing to the Ministry of Finance. The actions defined in Table 6 below are therefore focusing on full O&M cost recovery by 2020 as the primary objective.

A full cost recovery has to consider the specific Jordanian conditions as one of the most water scarce countries worldwide and in addition the geographic conditions, i.e. transporting and pumping water over long distances exceeding 300 km and high elevational differences of more than 1,300 m. The water tariff to be charged under consideration of such specific operating environment would have to be beyond socially acceptable limits. The current spending on water and wastewater reaches already about 5% of the average monthly income.

**The most important external cost driving factor, which the water sector has to address, is energy.**

The MWI has developed a two-pronged approach, which on one side focusses on reducing the dependency on the energy sector by developing and using renewable energy sources like wind and solar power (action B5) and on the other side improving energy efficiency in water pumping and operation of facilities (action B1). As the projects defined under these action points are already funded, the implementation will be completed within this planning period (2016-2021).

However, two of the major assumptions are that the present electricity tariff for WAJ is kept constant at to 0.094 JOD/kWh until end of 2017, increased to 0.1 JOD/kWh in 2018 and 0.105 JOD/kWh in 2020. From 2020 onwards it has been assumed that a reduction by approximately 25% due to alternative energy sources being available can be realized due to the operation of the gas from the East Mediterranean Sea.

**If these two assumptions cannot be considered, a full O&M cost recovery cannot be achieved by 2020, as the rise of electricity consumption and costs in some key utilities like Miyahuna and YWC is contributing to more than 50% of the operating costs.**

**Non-revenue water (NRW)** is the **second largest factor** to address and an internal water sector challenge, i.e. internal inefficiencies in management and operations heavily affecting revenues and costs. Despite the actions taken between 2013 and 2015, NRW even increased to reach a figure of more than 50% (see Figure 2). Major contributors to his negative trend are the arrival of more than 600,000 Syrian refugees in 2012 and 2013 and the commissioning of the Disi conveyor, driving up the water production and consumption in a water distribution system not designed for this sudden increase.

Previous water loss reduction or network rehabilitation projects in reality rather covered the needed network extensions and reinforcements to the system, which were definitely needed to cover the rapid population growth and several waves of refugees, but contributed little to the reduction of real water losses. A paradigm shift is needed to reserve a considerable part of the investments into water distribution networks for performance based NRW reduction projects. The actions proposed under B2 and B3 are supporting such approach.

Intervention areas in technical operations are the efficient management of intermittent water supply, reduction of excessive operating pressures, reinforcement of undersized distribution networks in Syrian refugee affected areas, efficient maintenance and repair services and active leakage control.

The administrative losses relate to inaccurate metering and/or defect water meters, illegal consumption, decreasing collection efficiency, outdated software, and loss of control in customer management especially in areas heavily affected by refugees. Actions under A2, A3, A4 and A21 shall result in a considerable revenue improvement and reduce the apparent loss component of the NRW.

Technical assistance projects already approved and funded by several international donors shall support the actions defined under actions A3, A21, B1, B2 and B3.

Actions related to increasing water tariffs and other revenue generating proposals are not easy to be implemented, considering the present geo-political developments in the region and the fading support from the international community for accommodating the huge number of Syrian refugees.

Thus, the action plan is focusing on activities which can be influenced by the water sector companies, and will reduce the overall losses but cannot achieve full cost recovery due to the above mentioned challenges.

The green colored boxes in Table 6 show actions for which funding has been secured or decisions have been taken, whereas the yellow colored boxes are related to actions for which funding is not yet secured or decisions are still pending.

Generally, most actions can be undertaken without major restrictions. Delays in timely implementation are expected due to more complicated and bureaucratic processes in project execution on both sides, international and national bodies.

The action plan covers a planning horizon of 5 years (2016 – 2021) and focuses on:

### 3.1 Revenue Improvement

- Increasing collection efficiency through performance based contracting, outsourcing and more Private Sector Participation (PSP), or any projects similar in nature and objectives.
- Increasing the revenue basis by connecting more customers to the wastewater collection systems presently under construction (action A5) and replacement of water meters.
- Reduction of accounts receivable and arrears.
- Adjustment of business processes, workflows and software modernization to reduce the apparent loss component of NRW.
- Tariff adjustments to distribute the burden to population in a socially acceptable way, in particular no tariff increase shall be applied on the lowest consumption block of 0 – 18 cbm/ quarter.

### 3.2 Cost Reduction

- Increase energy efficiency in pumping operations despite new and additional expensive water supply projects and alternatives (action B1).
- Reduction of the real physical loss component of NRW through targeted, performance based contracting models, investment into re-structuring of water networks, zoning & pressure management, efficient maintenance & repair services, active leakage control and automation of operations management and control (actions B2, B3 and B4).
- Reduce dependency of water sector energy supply from distribution companies by developing alternative sources (wind, solar, hydropower) within the sector (action B5 and B7).
- Reduce personnel costs through early retirement and retrenchment programs.

Table 6 below describes the planned activities and expected benefits during the plan period from 2016 – 2021. Further details on selected actions are shown in the respective Annexes A1-B7.

If the actions will be successfully implemented, the O&M cost recovery is achieved in the year 2020. Figure 5 and 6 show the impact of the Action Plan on WAJ Revenues and O&M costs.

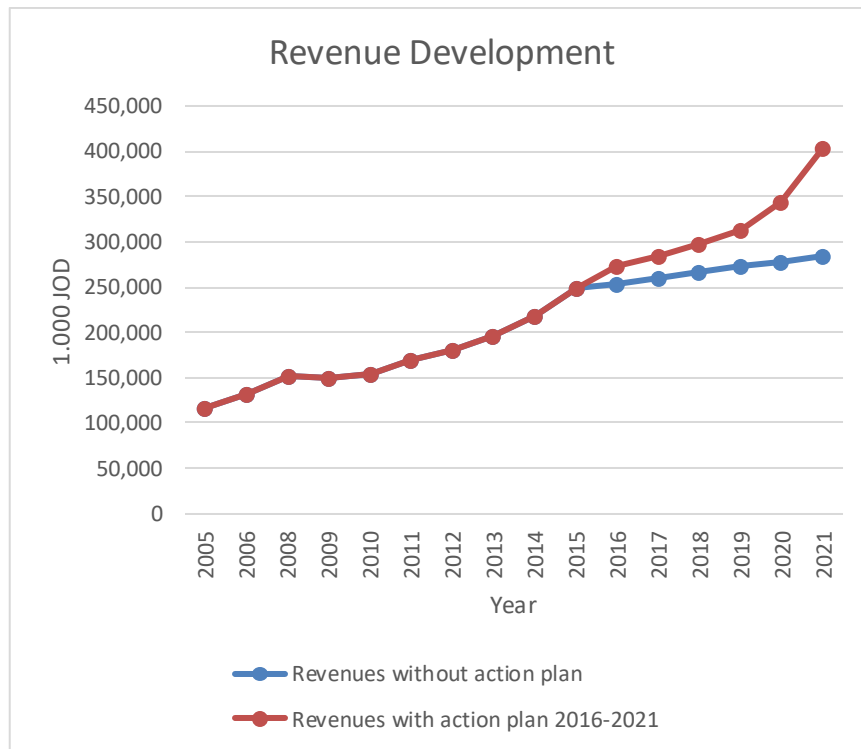
Critical is the development of the Syrian refugee crisis. Experience made by UNHCR in other crisis areas shows that the repatriation of refugees will on average take 10 – 15 years and a large number of refugees might never return. Jordan as a refugee country faced this experience several times.

As the direct and indirect costs of the Syrian refugee crisis are not adequately covered by the international community, the water sector will stay in crisis management mode for a long time.

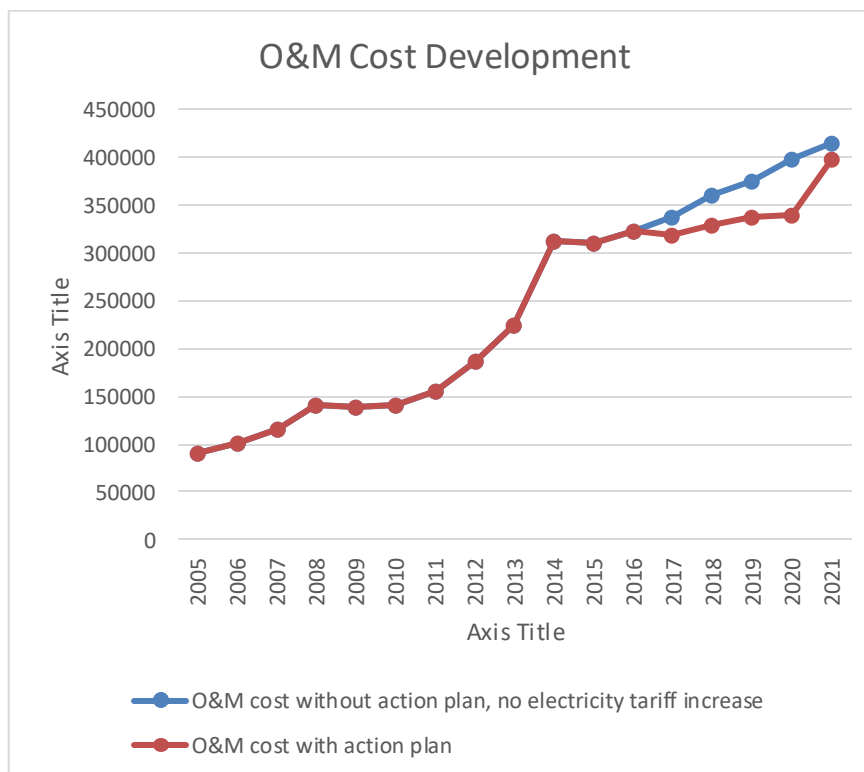
### Table 6 Planned Actions

| Ref.-no.  | Action   | Details   | Year of enforcement |                         |                | Average revenues/ cost reduction |                    |                    |                    |                    |                    |                    |                    | Cumulative 5 years<br>2016 - 2021 |
|---|--|---|---------------------|-------------------------|----------------|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------------------------------|
|   |  |   | Planned 2013        | Revised<br>planned 2016 | Actual         | Actionplan<br>2013<br>[1000 JOD] | 2015<br>[1000 JOD] | 2016<br>[1000 JOD] | 2017<br>[1000 JOD] | 2018<br>[1000 JOD] | 2019<br>[1000 JOD] | 2020<br>[1000 JOD] | 2021<br>[1000 JOD] |                                   |
| A   | REVENUE IMPROVEMENT  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
| A1  | Increase industrial groundwater charges  | 100% increase (from 0.25 to 0.5 JOD/m³  | 2013                |                         | 2014           | 10.833                           |                    |                    |                    |                    |                    |                    |                    | 0                                 |
| A2  | Improve collection efficiency through performance based contracting  | Internally delegated or externally tendered PBC's; 2% improvement until 100 % is reached  | 2014                |                         | partially 2015 | 3.610                            |                    | 500                | 1.500              | 2.500              | 3.500              | 3.500              | 3.500              | 15.000                            |
| A3  | Reduce accounts receivable   | Analysis & taskforce action to collect unpaid bills   | 2014                | 2017                    |                | 1.978                            |                    |                    | 6.681              | 14.115             | 12.302             | 9.639              | 8.555              | 51.291                            |
| A4  | Reduce illegal consumption   | Close illegal wells, implement groundwater monitoring by-law, water resources & networks campaign to reduce illegal use of water  | 2014                |                         | Ongoing        | 4.773                            | 2.268              | 2.342              | 2.435              | 2.550              | 2.660              | 2.780              | 2.900              | 17.934                            |
| A5  | Increase sewerage connection ratio   | Identify & connect potential & illegal customers, added floors charge   | 2014                | 2017                    |                | 3.425                            |                    |                    | 2.240              | 2.044              | 2.322              | 1.795              | 1.331              | 9.733                             |
| A6  | Increase of WW tariff in Amman and other Governorates  | 25% of Current Amman WW Tariff, 15% of other Governorate WW Tariff  | 2014                |                         | 2014           | 5.790                            |                    |                    |                    |                    |                    |                    |                    | 0                                 |
| A7  | Increase Water and Wastewater Connection Fees  | 15 % Increase for surface area of more than 250m2   | 2015                | 2017                    |                | 4.849                            |                    |                    | 339                | 373                | 410                | 451                | 496                | 2.069                             |
| A8  | Increase Industrial Ground Water Charges   | 50% increase (From 0.5 to 0.75 JOD/m3) for industries having no recycling facilities  | 2016                | 2019                    |                | 10.724                           |                    |                    |                    |                    | 5.000              | 5.000              |                    | 10.000                            |
| A9  | Increase Municipal Water Tariff  | 10% increase  | 2015                |                         | 2016           | 15.858                           |                    | 15.000             | 2.500              |                    |                    |                    |                    | 17.500                            |
| A10   | Increase Ground Water Irrigation Tariff in Highland  | Reduce free water from 150,000 m3/a to 75,000 m3/a  | 2017                |                         | 2015           | 8.000                            |                    | 442                | 442                | 442                | 442                | 442                | 442                | 2.650                             |
| A11   | Increase of WW tariff in Kingdom   | 15% of Current Amman WW Tariff, and other 15% on Governorate WW Tariff  | 2017                | 2018                    |                | 7.438                            |                    |                    |                    |                    | 6.011              |                    |                    | 6.011                             |
| A12   | Increase Municipal Water Tariff  | 15% increase  | 2018                | 2019                    |                | 34.814                           |                    |                    |                    |                    |                    | 30.000             |                    | 30.000                            |
| A13   | Increase Groundwater Irrigation Tariff in Highland   | Applying tariff on all wells  | 2020                | 2020                    |                | 8.000                            |                    |                    |                    |                    |                    |                    | 4.000              | 4.000                             |
| A14   | Increase Water and Wastewater Connection Fees  | 25 % increase   | 2020                | 2020                    |                | 6.658                            |                    |                    |                    |                    |                    |                    | 6.658              | 6.658                             |
| A15   | Increase Municipal Water Tariff  | 15% increase  | 2020                | 2020                    |                | 41.664                           |                    |                    |                    |                    |                    |                    | 50.000             | 50.000                            |
| A16   | Selling As Samra Wastewater for Power Plants   | 22.5 MCM at 0.33 JOD/m3   | 2021                | 2021                    |                | 10.125                           |                    |                    |                    |                    |                    |                    | 10.125             | 10.125                            |
| A17   | Selling water to Potash company  | 7 MCM at different prices WAJ at 1.25 JOD/m³, 50% share with JVA  |                     | 2017                    |                |                                  |                    |                    | 4.375              |                    |                    |                    |                    | 4.375                             |
| A18   | Agricultural wells tariff increase as result of deepening or drilling replacement wells  |   |                     | 2017                    |                |                                  |                    |                    | 600                | 600                | 600                | 600                | 600                | 3.000                             |
| A19   | Surcharges & penalties on illegal wells  | Agricultural  |                     | 2017                    |                |                                  |                    |                    | 600                | 600                | 600                | 600                | 600                | 3.000                             |
| A20   | Wastewater reuse charges   | Increase from 0.01 to 0.05 JOD/m3   |                     | 2017                    |                |                                  |                    |                    | 600                | 600                | 600                | 600                | 600                | 3.000                             |
| A21   | Reduction of apparent (administrative) losses = 50% of total NRW   | Increase billing through water meter replacement, identification of lost customers & Syrian refugee billing and payment process   |                     | 2017                    |                |                                  |                    |                    | 3.471              | 6.318              | 6.805              | 9.779              | 31.084             | 57.457                            |
|   | Sub-Total A - Revenue Improvement  |   |                     |                         |                | 178.539                          | 2.268              | 18.283             | 25.783             | 30.142             | 41.251             | 65.186             | 120.891            | 303.803                           |
| B   | COST REDUCTION   |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
| B1  | Cost Savings Due to improved pumping efficiency  | Investment in Water pumping & restructuring networks to reduce operating pressure of 75 MJOD  | 2016                | 2014-2022               | 2015 onwards   | 20.480                           | 300                | 109                | 109                | 4.747              | 8.092              | 2.568              |                    | 15.923                            |
| B2  | Reduction of technical water losses  | investment in restructuring, replacement & rehabilitation of water networks 150 – 200 MJOD  | 2015                | 2017                    |                | 7.558                            |                    |                    | 0                  | 10.047             | 11.491             | 6.522              | 3.299              | 31.359                            |
| B3  | Automation of water system operations  | Expand & optimize SCADA installation & operations data management, investment of 20 MJOD  | 2017                | 2018                    |                | 1.868                            |                    |                    | 0                  | 835                | 3.659              | 5.763              |                    | 10.258                            |
| B4  | Introduction of gravity water supply in Mafraq area  | Supply water from upper Aqeb wells to Mafraq and villages from new Aqeb reservoir, elimination of old Za'atary pumping station  |                     | 2018                    |                |                                  |                    |                    |                    | 741                |                    |                    |                    | 741                               |
| B5  | Introduction of Renewable Energy Sources in Water Sector   | 20% of energy consumed is produced by renewable sources   | 2020                | 2017 - 2019             |                | 42.400                           |                    |                    | 16.241             | 11.781             | 12.527             | 15.940             | 0                  | 56.490                            |
| B6  | Reduction of personnel costs   | 150 employees/year, based on average salary of 730 JOD/month  |                     | 2017                    |                |                                  |                    |                    | 1.313              | 1.313              | 1.313              | 1.313              | 1.313              | 6.565                             |
| B7  | Introduction of alternative sources for electricity generation   | Reduction of energy bill by 25%   |                     | 2020                    |                |                                  |                    |                    |                    |                    |                    | 25.508             | 10.932             | 36.440                            |
|   | Sub-Total B - Cost Reduction   |   |                     |                         |                | 72.306                           | 300                | 109                | 17.663             | 29.464             | 37.083             | 57.614             | 15.544             | 157.776                           |
| C   | Syrian Refugee Impact  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   | Annual additional cost related To Syrian Refugees Management contributing to low cost recovery                                       | MWI report on the direct cost incl. Capital investment for hosting 570,00 registered Syrian refugees on the water was 128 million JOD/a in 2013, with now 656,400 refugees and only considering O&M it amounts to 36.07 million JOD/a | 2013                |                         | 2015           | 128.000                          | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             |                                   |
|   | Sub-Total C - Impact Syrian Refugees   |   |                     |                         |                | 128.000                          | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             | 36.070             | 252.490                           |
| Grand Total Improvements by end of action plan                                      |  |   |                     |                         |                | 250.845                          | 2.568              | 18.392             | 43.446             | 59.606             | 78.333             | 122.800            | 136.435            | 461.580                           |
| Grand Total Improvements by end of action plan considering Syrian Refugee impact    |  |   |                     |                         |                | 122.845                          | -33.502            | -17.678            | 7.376              | 23.536             | 42.263             | 86.730             | 100.365            | 209.090                           |
| Revenues without action plan  |  |   |                     |                         |                |                                  | 249.400            | 254.388            | 259.476            | 267.260            | 272.605            | 278.057            | 283.618            | 1.864.805                         |
| Revenues with action plan 2016 -2022  |  |   |                     |                         |                |                                  | 249.400            | 272.671            | 285.259            | 297.402            | 313.856            | 343.243            | 404.509            | 2.166.340                         |
| O&M expenses without action plan  |  |   |                     |                         |                |                                  | 310.421            | 323.346            | 336.767            | 359.102            | 374.075            | 397.048            | 413.637            | 2.514.396                         |
| O&M expenses with action plan   |  |   |                     |                         |                |                                  | 310.121            | 323.237            | 319.105            | 329.638            | 336.992            | 339.434            | 398.093            | 2.356.620                         |
| Operating ratio without action plan   |  |   |                     |                         |                |                                  | 80                 | 79                 | 77                 | 74                 | 73                 | 70                 | 69                 |                                   |
| Operating ratio with action plan and consideration of Syrian refugee impact         |  |   |                     |                         |                |                                  | 80                 | 84                 | 89                 | 90                 | 93                 | 101                | 102                |                                   |
| Operating ratio with action plan but excluding cost of Syrian refugee impact on O&M |  |   |                     |                         |                |                                  | 91                 | 95                 | 101                | 101                | 104                | 113                | 112                |                                   |
| Assumptions:  | No return of refugees to Syria within action plan duration   |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   | Regular increase in revenues 2% and costs without action plan 3% annually + moderate increase electricity tariff from 0.094 to 0.105 |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   | 3% margin of error to be considered  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |
|   |  |   |                     |                         |                |                                  |                    |                    |                    |                    |                    |                    |                    |                                   |





**Figure 5 Effect of Action Plan on WAJ Revenues (1000 JOD)**



**Figure 6 Effect of Action Plan on WAJ O&M Cost**

### 3.3 Effect of Action Plan on Loss Reduction

Looking back to 2010, WAJ was able to cover its O&M cost, reaching an operating ratio (revenues divided by operating cost) above 100%. **Error! Reference source not found.** Figure 7 below illustrates the development since 2005 and includes three major impacts:

- Arrival of more than 1.3 million Syrian refugees (out of which 646,000 are registered with UNHCR);
- Development and implementation of the Action plan 2013-2016;
- Dramatic increase of electricity tariffs between 2010 and 2015 by 124 %.

The improvements as planned in the action plan 2016 – 2021 will lead to the O&M cost recovery in 2020. If deducting the direct O&M costs related to registered Syrian refugees, the O&M cost recovery would be reached much earlier in 2017.

Although included since 2015 in the JRP, no international support to cover the direct O&M costs of registered Syrian refugees could be secured. Subsequently O&M and overall Losses will have to be covered by governmental subsidies.

Major contributor to the O&M cost is clearly the electricity consumption; if the 2015 electricity tariff can be kept, an O&M cost recovery of 100% (without direct Syrian refugee costs) is achievable as soon as the actions planned for energy efficiency and introduction of renewable energy are implemented.

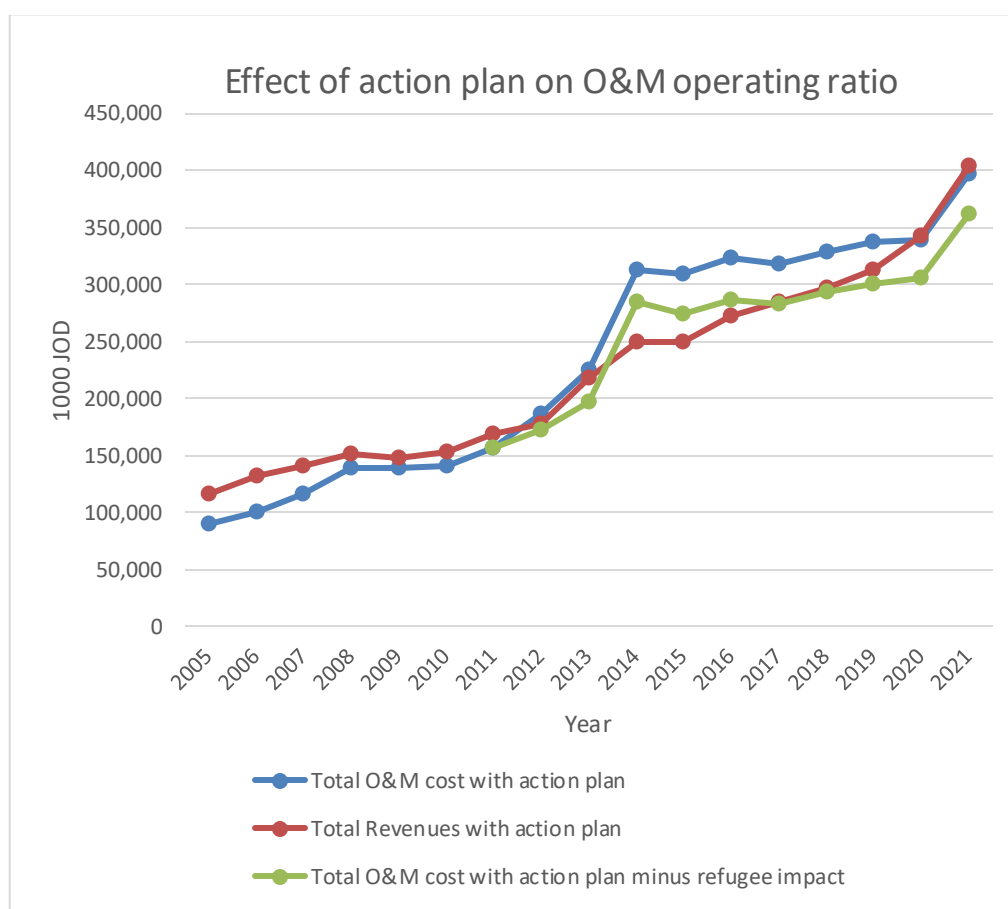


Figure 7 O&M cost coverage

### 3.4 Improvement of operating ratio

Prior to the Syrian crisis, back in 2009, WAJ was able to cover its operating cost. The operating ratio since 2010 decreased, and reached only 80% in 2015. Two major factors negatively affecting WAJ performance were:

1. A rapid increase of electricity tariffs since 2010;
2. Arrival of more than 1.2 million Syrian refugees.

Figure 8 below shows the expected development for the years 2015 – 2021, and illustrates the effect on the operating ratio if no action would be taken, implementation of the action plan including the Syrian refugee impact and the theoretical development if the direct O&M cost of Syrian refugees is taken out of the O&M cost calculation.

If all actions will be implemented as planned, the operating ratio is reaching 101 % in 2020 and 102 % in 2021.

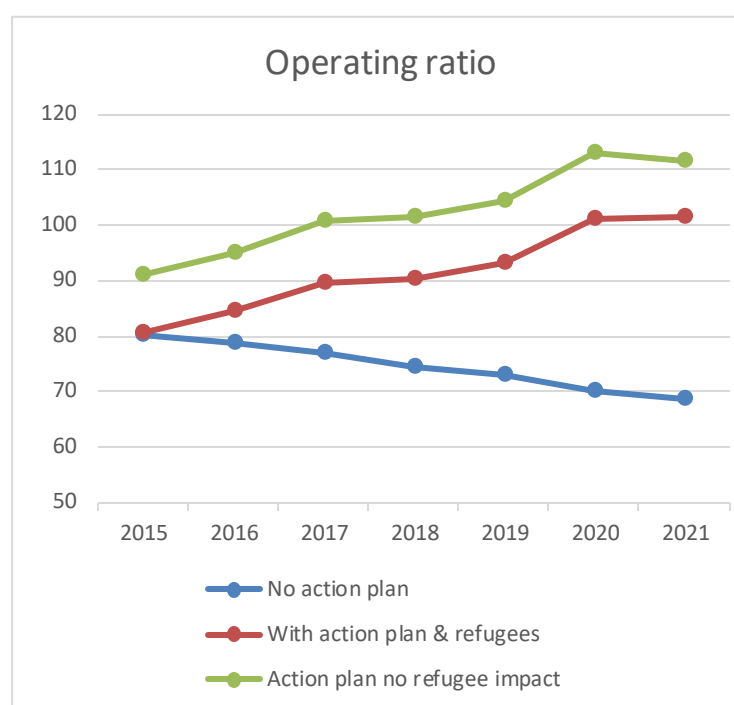


Figure 8 Development of operating ratio

## Annexes

|           |   |   |
|-----------|---|---|
| Annex A1  | - | Increase industrial groundwater charges                       |
| Annex A3  | - | Reduce accounts receivable (arrears)                          |
| Annex A4  | - | Reduce illegal consumption                                    |
| Annex A5  | - | Increase sewerage connection ratio                            |
| Annex A7  | - | Increase water and wastewater connection fees                 |
| Annex A9  | - | Increase municipal water tariff                               |
| Annex A10 | - | Increase groundwater irrigation tariff in highlands           |
| Annex A11 | - | Increase wastewater tariff 2017                               |
| Annex A20 | - | Adjust wastewater reuse charges                               |
| Annex A21 | - | Reduction of apparent water losses (administrative losses)    |
| Annex B1  | - | Cost savings due to improved energy efficiency                |
| Annex B2  | - | Reduction of technical water losses (real losses)             |
| Annex B3  | - | Automation of water systems operations                        |
| Annex B4  | - | Gravity supply Mafrq area – reduction of energy consumption   |
| Annex B5  | - | Cost savings due to introduction of renewable energy usage    |
| Annex B6  | - | Reduction of personnel costs                                  |
| Annex B7  | - | Use of alternative energy sources to reduce electricity costs |

## Annex A 1

### Increase industrial groundwater charges

| Item  | Project | Funding agency | Details | Source of Information   | Add. Revenue average<br>[1000 JOD/a] | Additional revenue   |                 |                 |                      |                 |                 |                 |                 | Remarks |
|-------|---------|----------------|---------|-------------------------|--------------------------------------|----------------------|-----------------|-----------------|----------------------|-----------------|-----------------|-----------------|-----------------|---------|
|       |         |                |         |                         |                                      | 2015<br>[1000 JOD/a] | 2016<br>[JOD/a] | 2017<br>[JOD/a] | 2018<br>[1000 JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |         |
|       |         |                |         | WAJ Finance Directorate | 8.890                                | 8.551                |                 |                 |                      |                 |                 |                 |                 |         |
|       |         |                |         |                         |                                      |                      |                 |                 |                      |                 |                 |                 |                 |         |
|       |         |                |         |                         |                                      |                      |                 |                 |                      |                 |                 |                 |                 |         |
|       |         |                |         |                         |                                      |                      |                 |                 |                      |                 |                 |                 |                 |         |
|       |         |                |         |                         |                                      |                      |                 |                 |                      |                 |                 |                 |                 |         |
| Total |         |                |         |                         | 8.890                                | 8.551                | 0               | 0               | 0                    | 0               | 0               | 0               | 0               |         |

Increase of industrial ground water charge effective Nov 2013

| Ref.-no.                  | Action taken                               | 5-Jun-13   | Effective  | Effective  |
|---------------------------|--|--|------------|------------|
| A1                        | Increase of industrial ground water charge | 100% increase (from 0.25 to 0.5 JOD/m <sup>3</sup> ) |            |            |
| Company /Governorate      | Base year                                  | Actual   | Actual     | Estimated  |
|                           | 2013                                       | 2014   | 2015       | 2016       |
|                           | JOD  | JOD  | JOD        | JOD        |
| Water Authority of Jordan | 7.918.096                                  | 14.493.361   | 16.468.917 | 16.808.592 |
| Total                     | 7.918.096                                  | 14.493.361   | 16.468.917 | 16.808.592 |

Assumption: 1- The estimated revenues for 2016 are calculated based on the average for 2013 and 2014 and a 2- The increase from (.5 to .75 JOD /m<sup>3</sup>) expected to be implemented in 2018

## Annex A3

### Reduce accounts receivable (arrears)

| Item  | Project  | Funding agency | Year of enforcement | Details  | Source of Information               | Accounts receivable 2015 [1,000 JOD] | Cost reduction     |                    |                    |                    |                    |                    | Remarks |
|-------|--|----------------|---------------------|--|-------------------------------------|--------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------|
|       |  |                |                     |  |                                     |                                      | 2017 [1,000 JOD/a] | 2018 [1,000 JOD/a] | 2019 [1,000 JOD/a] | 2020 [1,000 JOD/a] | 2021 [1,000 JOD/a] | 2022 [1,000 JOD/a] |         |
| 1     | Taskforce action by WAJ Finance Deptt.   |                | 2017                | Establishment of taskforces and application of revised Ameri law procedures in WAJ utility units | Finance Department                  | 16.947                               | 953                | 1.799              | 1.597              | 1.417              | 1.258              | 1.116              | 8.141   |
| 2     | Management of Watr Resources - Output B  | GIZ            | 2017                | Improvmeent of WAJ Balqa performance   | Finance Department                  | 8.460                                | 476                | 898                | 797                | 707                | 628                | 557                | 1.374   |
| 3     | Strenghtening the Resilience of Water Utilities in Jordan (RWU), Water Management Initiative (WMI) | GIZ / USAID    | 2017                | Improvement of YWC performance   | PMU -Regulatory Affairs Directirate | 42.507                               | 2.391              | 6.017              | 5.115              | 3.261              | 2.894              | 2.568              | 22.246  |
| 4     | Miyahuna AR reduction taskforce Water Management Initiative (WMI)                                  | self/USAID     | 2017                | Establishment of taskforces and application of revised Ameri law procedures in WAJ utility units | PMU -Regulatory Affairs Directirate | 44.970                               | 2.530              | 4.775              | 4.237              | 3.761              | 3.338              | 2.962              | 21.602  |
| 5     | Aqaba Water Company AR reduction taskforce Water Management Initiative (WMI)                       | self /USAID    | 2017                | Establishment of taskforces and application of revised Ameri law procedures in WAJ utility units | PMU -Regulatory Affairs Directirate | 5.893                                | 331                | 626                | 555                | 493                | 437                | 388                | 2.831   |
|       |  |                |                     |  |                                     |                                      |                    |                    |                    |                    |                    |                    |         |
| Total |  |                |                     |  |                                     | 118.777                              | 6.681              | 14.115             | 12.302             | 9.639              | 8.555              | 7.592              |         |

#### Assumption:

Collectible: 75%  
Reduction per year: 15%  
For YWC in 2018/19 20%

Variables

| Utility  | 2013 [1,000 JOD] | 2014 [1,000 JOD] | 2015 [1,000 JOD] | Increase 2013-2015 [%] | Remarks                                   |
|----------|------------------|------------------|------------------|------------------------|---|
| Miyahuna | 22.453           | 22.926           | 27.534           | 23                     |   |
| Zarqa    | 10.696           | 12.706           | 13.957           | 30                     | managed by Miyahuna from Jan 2015         |
| Madaba   | 3.521            | 3.550            | 3.479            | -1                     | managed by Miyahuna from 2nd quarter 2013 |
| YWC      | 33.956           | 37.968           | 42.507           | 25                     |   |
| AWC      | 5.172            | 6.253            | 5.893            | 14                     |   |
| Balqa    | 6.443            | 7.625            | 8.460            | 31                     |   |
| Karak    | 4.054            | 5.134            | 6.087            | 50                     |   |
| Tafleeh  | 2.599            | 3.241            | 3.665            | 41                     |   |
| Maan     | 5.875            | 6.495            | 7.195            | 22                     |   |
| TOTAL    | 94.769           | 105.898          | 118.777          | 25                     |   |

Source: Public companies from PMU  
WAJ governorates from Finance Directorate

## Annex A 4

### Reduce illegal consumption

| Item  | Project   | Funding agency, if any | Year of enforcement | Details  | Source of Information                  | Water saved<br>[m3/a] | Cost reduction/ Increased Revenue |                 |                 |                 |                 |                 |                 |                 | Remarks                                     |
|-------|---|------------------------|---------------------|--|--|-----------------------|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---|
|       |   |                        |                     |  |  |                       | 2015<br>[JOD/a]                   | 2016<br>[JOD/a] | 2017<br>[JOD/a] | 2018<br>[JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |   |
| A4.1  | Water resources and networks campaign/ Illegal GW wells             |                        | 2014                | Demolition.<br>Water law adjustments (penalties).<br>The judicial police.<br>Drilling rigs regulation  | WAJ Basins Dept.                       | 1.522.740             | 127.863                           | 91.500          | 85.000          | 75.000          | 60.000          | 55.000          | 50.000          | 45.000          | No. Of illegal wells decreasing over time   |
| A4.2  |   |                        | 2014                | GW monitoring by-law (Tariff increases and instructions).<br>Agreements and MoU with police depts.<br>Capacity building : procedures, HR, Training and Incentives.<br>Water resources Monitoring system<br>The judicial police, 2014 billed: 7,900,000 JOD | WAJ Basins Dept.<br>WAJ HR Dept.       |                       | 640.000                           | 675.000         | 700.000         | 725.000         | 750.000         | 775.000         | 800.000         | 825.000         | Actual collection lower than billed amounts |
| A4.3  | Water resources and networks campaign/Illegal use of water networks |                        | 2014                | Water law adjustments (penalties).<br>Working teams establishment.<br>The judicial police.<br>Incentives System.   | Subscribers Depts.<br>Operations Dept. | 51.194.681            | 1.500.000                         | 1.575.000       | 1.650.000       | 1.750.000       | 1.850.000       | 1.950.000       | 2.050.000       | 2.150.000       |   |
|       |   |                        |                     |  |  |                       |                                   |                 |                 |                 |                 |                 |                 |                 |   |
|       |   |                        |                     |  |  |                       |                                   |                 |                 |                 |                 |                 |                 |                 |   |
|       |   |                        |                     |  |  |                       |                                   |                 |                 |                 |                 |                 |                 |                 |   |
| Total |   |                        |                     |  |  | 52.717.421            | 2.267.863                         | 2.341.500       | 2.435.000       | 2.550.000       | 2.660.000       | 2.780.000       | 2.900.000       | 3.020.000       |   |

## Annex A5

### Increase sewerage connection ratio

| Item  | Project   | Funding agency | Year of completion | No. of house Connections | Source of Information | Total connection fees<br>[1,000 JOD] | Cost reduction        |                       |                       |                       |                       |                       | Remarks |
|-------|---|----------------|--------------------|--------------------------|-----------------------|--------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------|
|       |   |                |                    |                          |                       |                                      | 2017<br>[1,000 JOD/a] | 2018<br>[1,000 JOD/a] | 2019<br>[1,000 JOD/a] | 2020<br>[1,000 JOD/a] | 2021<br>[1,000 JOD/a] | 2022<br>[1,000 JOD/a] |         |
| 1     | South Amman Wastewater Networks Phase 1   |                | 2017               | 9554                     | WAJ Sewerage Deptt.   | 1.529                                | 459                   | 306                   | 306                   | 229                   | 153                   | 76                    |         |
| 2     | Greater Irbid sewage/ Wadi Al Shallala treatment plant/ Phase II (network and stations)     | KfW            | 2016               | 6600                     | WAJ Sewerage Deptt.   | 1.056                                | 317                   | 211                   | 211                   | 158                   | 106                   | 53                    |         |
| 3     | Implementation Project Miscellaneous Sewage In Madaba                                       |                | 2016/2017          | 214                      | WAJ Sewerage Deptt.   | 34                                   | 2                     | 2                     | 2                     | 2                     | 2                     | 2                     |         |
| 4     | Sewage Networks In (AL-Ashgal District, AL-Iskan District, AL-Istirahah District) / Maan    |                | 2016/2017          | 324                      | WAJ Sewerage Deptt.   | 52                                   | 3                     | 3                     | 3                     | 3                     | 2                     | 2                     |         |
| 5     | Implementation Project Miscellaneous Sewage In Al-Taybeh- Wadi Mosa                         |                | 2016/2017          | 26                       | WAJ Sewerage Deptt.   | 4                                    | 1                     | 0                     | 0                     | 0                     | 0                     | 0                     |         |
| 6     | Al-Qwasmeh Sewage Network   |                | 2016               | 1011                     | WAJ Sewerage Deptt.   | 162                                  | 49                    | 32                    | 32                    | 24                    | 16                    | 8                     |         |
| 7     | Al-Jwaideh Sewage Network   |                | 2016               | 1630                     | WAJ Sewerage Deptt.   | 261                                  | 78                    | 52                    | 52                    | 39                    | 26                    | 13                    |         |
| 8     | Beit Ras Sewerage network   | EU             | 2018               | 1676                     | PMU                   | 268                                  |                       | 80                    | 54                    | 54                    | 40                    | 40                    |         |
| 9     | Wastewater system Mafraq/ Manshiet Beni Hassan  | KfW            | 2018               | 6436                     | PMU                   | 1.030                                | 0                     | 309                   | 206                   | 206                   | 154                   | 154                   |         |
| 10    | Sewage Projects for West Irbid Villages of Kafr Yoba , Beit Yafa , & Jamha                  | KfW/AFD        | 2019               | 3275                     | WAJ Sewerage Deptt.   | 524                                  | 157                   | 105                   | 105                   | 79                    | 52                    | 26                    |         |
| 11    | Construction of Water & sewage systems in Irbid governorate(Hakama , Mughayyer , Wasatiya ) | KfW/AFD        | 2019               | 9599                     | WAJ Sewerage Deptt.   | 1.536                                | 0                     | 0                     | 461                   | 307                   | 307                   | 230                   |         |
| 12    | Shafa Badran Wastewater Collection Networks   | KfW            | 2017/2019          | 3349                     | WAJ Sewerage Deptt.   | 536                                  | 0                     | 161                   | 107                   | 107                   | 80                    | 54                    |         |
| 13    | South Amman Wastewater Networks Phase 2   |                |                    | 8221                     | WAJ Sewerage Deptt.   | 1.315                                | 395                   | 263                   | 263                   | 197                   | 132                   | 66                    |         |
| 14    | Millenium Challenge Account Jordan-connection of 65,000 residents = 16,250 connections      | US Govt.       | 2016               | 16250                    | MCA Jordan            | 2.600                                | 780                   | 520                   | 520                   | 390                   | 260                   | 130                   |         |
|       |   |                |                    |                          |                       | 0                                    | 0                     | 0                     | 0                     | 0                     | 0                     | 0                     |         |
| Total |   |                |                    |                          |                       | 10.906                               | 2.240                 | 2.044                 | 2.322                 | 1.795                 | 1.331                 | 855                   |         |

Assumption: Phased connection of customers over 6 years

100%

Year 1: 30%  
Year 2: 20%  
Year 3: 20%  
Year 4: 15%  
Year 5: 10%  
Year 6: 5%

Average connection fee: 160 JOD

Variables



Annex A 7

Increase water and wastewater connection fees

A 15 % Increase for built-up area of more than 250m2 shall be implemented in 2017

| Item  | Project                                     | Avrge. Revenue<br>increase per year | Year of<br>enforcement | Details   | Source of<br>Information | 15% Revenue<br>increase<br>[1000 JOD/a] | Cost reduction/ Increased Revenue |              |              |              |              |              |              |              | Remarks |
|-------|---|-------------------------------------|------------------------|---|--------------------------|---|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------|
|       |   |                                     |                        |   |                          |   | 2015                              | 2016         | 2017         | 2018         | 2019         | 2020         | 2021         | 2022         |         |
|       |   |                                     |                        |   |                          |   | [1000 JOD/a]                      | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] |         |
|       | Increase water & wastewater connection fees | 2260                                | 2017                   | 15% increase for built-up area of more than 250m2 | WAJ Finance Directorate  | 339                                     |                                   |              | 339          | 373          | 410          | 451          | 496          | 546          |         |
|       |   |                                     |                        |   |                          |   |                                   |              |              |              |              |              |              |              |         |
|       |   |                                     |                        |   |                          |   |                                   |              |              |              |              |              |              |              |         |
|       |   |                                     |                        |   |                          |   |                                   |              |              |              |              |              |              |              |         |
|       |   |                                     |                        |   |                          |   |                                   |              |              |              |              |              |              |              |         |
|       |   |                                     |                        |   |                          |   |                                   |              |              |              |              |              |              |              |         |
| Total |   |                                     |                        |   |                          | 339                                     | 0                                 | 0            | 339          | 373          | 410          | 451          | 496          | 546          |         |

| A7      | Increase Water and Wastewater Connection Fees | 15 % Increase                  |           |            |                        |         |            |                          |         |            |           |           |            |                           |         |            |                     |         |            |                         |         |            |             | A         |            |            | Estimated Total increase for year 2016=(A *4) |
|---------|---|--------------------------------|-----------|------------|------------------------|---------|------------|--------------------------|---------|------------|-----------|-----------|------------|---------------------------|---------|------------|---------------------|---------|------------|-------------------------|---------|------------|-------------|-----------|------------|------------|---|
| Mounth  | Invoice item                                  | Amman Water Company (Miyahuna) |           |            | Zarq Water Governorate |         |            | Madaba Water Governorate |         |            | Total     |           |            | Water Authority of Jordan |         |            | Aqaba Water Company |         |            | Alyarmouk Water Company |         |            | Grand Total |           |            |            |   |
|         |   | 2015 Q1                        | 2016 Q1   | Difference | 2015 Q1                | 2016 Q1 | Difference | 2015 Q1                  | 2016 Q1 | Difference | 2015 Q1   | 2016 Q1   | Difference | 2015 Q1                   | 2016 Q1 | Difference | 2015 Q1             | 2016 Q1 | Difference | 2015 Q1                 | 2016 Q1 | Difference | 2015 Q1     | 2016 Q1   | Difference | Difference |   |
| January |   | JOD                            | JOD       | JOD        | JOD                    | JOD     | JOD        | JOD                      | JOD     | JOD        | JOD       | JOD       | JOD        | JOD                       | JOD     | JOD        | JOD                 | JOD     | JOD        | JOD                     | JOD     | JOD        | JOD         | JOD       | JOD        | JOD        |   |
|         | Water Connection                              | 1.866.867                      | 2.020.873 | 154.006    | 221.636                | 330.440 | 108.804    | 41.518                   | 46.697  | 5.179      | 2.130.021 | 2.398.010 | 267.989    | 46.522                    | 111.415 | 64.893     | 210.000             | 208.000 | -2.000     | 533.084                 | 531.703 | -1.381     | 2.919.627   | 3.249.128 | 329.501    | 1.318.004  |   |
|         | Wastewater Connection                         | 1.729.911                      | 1.810.733 | 80.822     | 154.799                | 310.176 | 155.377    | 24.695                   | 24.951  | 256        | 1.909.405 | 2.145.860 | 236.455    | 6.848                     | 10.231  | 3.383      | 236.000             | 401.000 | 165.000    | 518.070                 | 348.636 | -169.434   | 2.670.323   | 2.905.727 | 235.404    | 941.616    |   |
| Total   |   | 3.596.778                      | 3.831.606 | 234.828    | 376.435                | 640.616 | 264.181    | 66.213                   | 71.648  | 5.435      | 4.039.426 | 4.543.870 | 504.444    | 53.370                    | 121.646 | 68.276     | 446.000             | 609.000 | 163.000    | 1.051.154               | 880.339 | -170.815   | 5.589.950   | 6.154.855 | 564.905    | 2.259.620  |   |

Note The increase on connection fees depends on the number new of subscribers that will be connected as result of water and sanitation projects implemented recently and the old once and how to follow up on that.

in % 10,1

Annex A 9

Increase municipal water tariff

A 10 % Increase took effect from October 2015  
The table below is comparing the 1st quarter 2015 with the same period 2016, resulting in a JOD 3.165 million increase for the winter quarter resulting in a JOD 3.165 million increase for the winter quarter  
resulting in a JOD 3.165 million increase for the winter quarter

For the summer quarters, a JOD 4.7 million increase in revenue is expected  
Assumption: winter and 2 summer quarters to be considered for annual revenue, 5% increase in consumption and revenues per year

Expected annual revenue JOD 17.3 million

| Ref.-no.            | Action taken                    | 6-Sep-15                       | Effective  | 1-Oct-15   |                         |           |            |                          |         |            |            |            |            |                     |           |            |                         |           |            |                           |           | A          |                            |
|---------------------|---------------------------------|--------------------------------|------------|------------|-------------------------|-----------|------------|--------------------------|---------|------------|------------|------------|------------|---------------------|-----------|------------|-------------------------|-----------|------------|---------------------------|-----------|------------|----------------------------|
| A9                  | Increase Municipal Water Tariff | 10% increase                   |            |            |                         |           |            |                          |         |            |            |            |            |                     |           |            |                         |           |            |                           |           |            |                            |
| Month               | Invoice Item                    | Amman Water Company (Miyahuna) |            |            | Zarqa Water Governorate |           |            | Madaba Water Governorate |         |            | Total      |            |            | Aqaba Water Company |           |            | Alyarmouk Water Company |           |            | Water Authority of Jordan |           |            | Total Increase for quarter |
|                     |                                 | 2015 Q1                        | 2016 Q1    | Difference | 2015 Q1                 | 2016 Q1   | Difference | 2015 Q1                  | 2016 Q1 | Difference | 2015 Q1    | 2016 Q1    | Difference | 2015 Q1             | 2016 Q1   | Difference | 2015 Q1                 | 2016 Q1   | Difference | 2015 Q1                   | 2016 Q1   | Difference |                            |
| January             | Water revenue +fixed amount     | JOD                            | JOD        | JOD        | JOD                     | JOD       | JOD        | JOD                      | JOD     | JOD        | JOD        | JOD        | JOD        | JOD                 | JOD       | JOD        | JOD                     | JOD       | JOD        | JOD                       | JOD       | JOD        |                            |
|                     |                                 | 741.152                        | 1.208.179  | 467.027    | 46.522                  | 111.415   | 64.893     | 24.390                   | 42.125  | 17.735     | 812.064    | 1.361.719  | 549.655    | 1.854.011           | 2.135.682 | 281.671    | 0                       | 0         | 0          | 0                         | 0         | 0          |                            |
|                     | Sewage fees(utilization)        | 90.560                         | 103.839    | 13.279     | 6.848                   | 10.231    | 3.383      | 2.196                    | 2.586   | 390        | 99.604     | 116.656    | 17.052     | 560.727             | 554.567   | -6.160     | 0                       |           |            | 0                         | 0         | 0          |                            |
| February            | Water revenue +fixed amount     | 4.177.043                      | 5.685.003  | 1.507.960  | 239.350                 | 488.971   | 249.621    | 155.327                  | 287.619 | 132.292    | 4.571.720  | 6.461.593  | 1.889.873  | 850.946             | 478.671   | -372.275   | 0                       |           |            | 0                         | 0         | 0          |                            |
|                     | Sewage fees(utilization)        | 906.593                        | 946.017    | 39.424     | 55.702                  | 78.896    | 23.194     | 22.400                   | 29.230  | 6.830      | 984.695    | 1.054.143  | 69.448     | 82.662              | 30.043    | -52.619    | 0                       |           |            | 0                         | 0         | 0          |                            |
|                     |                                 |                                |            |            |                         |           |            |                          |         |            |            |            |            |                     |           |            |                         |           |            |                           |           |            |                            |
| March               | Water revenue +fixed amount     | 4.222.528                      | 4.065.777  | -156.751   | 214.085                 | 354.696   | 140.611    | 147.551                  | 179.945 | 32.394     | 4.584.164  | 4.600.418  | 16.254     | 530.828             | 463.043   | -67.785    | 0                       |           |            | 0                         | 0         | 0          |                            |
|                     | Sewage fees(utilization)        | 1.568.091                      | 1.456.447  | -111.644   | 76.776                  | 107.147   | 30.371     | 34.494                   | 38.789  | 4.295      | 1.679.361  | 1.602.383  | -76.978    | 7.541               | 18.395    | 10.854     | 0                       |           |            | 0                         | 0         | 0          |                            |
|                     |                                 |                                |            |            |                         |           |            |                          |         |            |            |            |            |                     |           |            |                         |           |            |                           |           |            |                            |
| Total Water Revenue |                                 | 9.140.723                      | 10.958.959 | 1.818.236  | 499.957                 | 955.082   | 455.125    | 386.358                  | 580.294 | 182.421    | 10.027.038 | 12.494.335 | 2.455.782  | 3.235.785           | 3.077.396 | -158.389   | 5.594.295               | 6.328.997 | 734.702    | 3.431.415                 | 3.681.459 | 250.044    | 3.282.139                  |
| TotalSewage fees    |                                 | 2.565.244                      | 2.506.303  | -58.941    | 139.326                 | 196.274   | 56.948     | 59.090                   | 70.605  | 11.515     | 2.763.660  | 2.773.182  | 9.522      | 650.930             | 603.004   | -47.926    | 749.533                 | 737.897   | -11.636    | 716.003                   | 649.380   | -66.623    | -116.663                   |
| Grand Total         |                                 | 11.705.967                     | 13.465.262 | 1.759.295  | 639.283                 | 1.151.356 | 512.073    | 445.448                  | 650.899 | 193.936    | 12.790.698 | 15.267.517 | 2.465.304  | 3.886.715           | 3.680.400 | -206.315   | 6.343.828               | 7.066.894 | 723.066    | 4.147.418                 | 4.330.839 | 183.421    | 3.165.476                  |

Considering summer season average quarterly revenue 4.700.000

Annual increase due to 10% tariff increase 17.265.476  
rounded up 17.300.000  
Assumption: 5% growth/a in consumption

Assumption: the incremental increase for Q1 2015-2016 is about (3) Mill.JOD covering the winter season, while the estimated mounts for next quarters which covers the summer season are expected to reach (4.7)Mill JOD each quarter.

## Annex A 10

### Increase groundwater irrigation tariff in highlands

Reduce free water from 150,000 m3/a to 75,000 m3/a

| Item  | Project   | Avrge. Revenue 2015 in [JOD/a] | Year of enforcement | Details  | Source of Information   | Revenue increase [1000 JOD/a] | Cost reduction/ Increased Revenue |                   |                   |                   |                   |                   |                   |                   | Remarks |
|-------|---|--------------------------------|---------------------|--|-------------------------|-------------------------------|-----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------|
|       |   |                                |                     |  |                         |                               | 2015 [1000 JOD/a]                 | 2016 [1000 JOD/a] | 2017 [1000 JOD/a] | 2018 [1000 JOD/a] | 2019 [1000 JOD/a] | 2020 [1000 JOD/a] | 2021 [1000 JOD/a] | 2022 [1000 JOD/a] |         |
|       | Agricultural wells tariff increase as result of deepening or drilling replacement wells | 441.654                        | 2015                | Reduce free water from 150,000 m3/a to 75,000 m3/a | WAJ Finance Directorate | 442                           |                                   | 442               |                   |                   |                   |                   |                   |                   |         |
|       |   |                                |                     |  |                         |                               |                                   |                   |                   |                   |                   |                   |                   |                   |         |
|       |   |                                |                     |  |                         |                               |                                   |                   |                   |                   |                   |                   |                   |                   |         |
|       |   |                                |                     |  |                         |                               |                                   |                   |                   |                   |                   |                   |                   |                   |         |
|       |   |                                |                     |  |                         |                               |                                   |                   |                   |                   |                   |                   |                   |                   |         |
|       |   |                                |                     |  |                         |                               |                                   |                   |                   |                   |                   |                   |                   |                   |         |
| Total |   |                                |                     |  |                         | 442                           | 0                                 | 442               | 0                 | 0                 | 0                 | 0                 | 0                 | 0                 |         |

Agricultural wells tariff increase as result of deepening or drilling replacement wells

| Ref.-no.                  | Action taken  | 14-Jun-15  | Effective | 1-Jan-16  |
|---------------------------|---|--|-----------|-----------|
| A19+A10                   | Agricultural wells tariff increase as result of deepening or drilling replacement wells | Reduce free water from 150,000 m3/a to 75,000 m3/a |           |           |
| Company /Governorate      | Base year   | Actual   | Actual    | Estimated |
|                           | 2013  | 2014   | 2015      | 2016      |
|                           | JOD   | JOD  | JOD       | JOD       |
| Water Authority of Jordan | 957.260   | 950.062  | 1.083.570 | 1.525.224 |
| Total                     | 957.260   | 950.062  | 1.083.570 | 1.525.224 |

Note: 1- The estimated revenues for year 2016 calculated based on average for 2014 and 2015 multiply 50% increase due to decrease of the free water quantity from 150,000 m3/a to 75,000 m3/a

Annex A 11

Increase wastewater tariff 2017

A 25 % increase for Amman and 15% in other governorates shall be implemented in 2014

| Item  | Project                       | Avrge. Revenue<br>increase 2013-2015 | Year of<br>enforcement | Details  | Source of<br>Information   | Cost reduction/ Increased Revenue |                      |                      |                      |                      |                      |                      |                      | Remarks |
|-------|-------------------------------|--------------------------------------|------------------------|--|----------------------------|-----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|
|       |                               |                                      |                        |  |                            | 2015<br>[1000 JOD/a]              | 2016<br>[1000 JOD/a] | 2017<br>[1000 JOD/a] | 2018<br>[1000 JOD/a] | 2019<br>[1000 JOD/a] | 2020<br>[1000 JOD/a] | 2021<br>[1000 JOD/a] | 2022<br>[1000 JOD/a] |         |
|       | Increase Wastewater<br>Tariff | 9.030.498                            | 2014                   | 25% of Current<br>Amman WW Tariff,<br>15% of other<br>Governorate WW<br>Tariff | WAJ Finance<br>Directorate | 4.515                             | 4.741                | 4.978                | 6.011                |                      |                      |                      |                      |         |
|       |                               |                                      |                        |  |                            |                                   |                      |                      |                      |                      |                      |                      |                      |         |
|       |                               |                                      |                        |  |                            |                                   |                      |                      |                      |                      |                      |                      |                      |         |
|       |                               |                                      |                        |  |                            |                                   |                      |                      |                      |                      |                      |                      |                      |         |
|       |                               |                                      |                        |  |                            |                                   |                      |                      |                      |                      |                      |                      |                      |         |
|       |                               |                                      |                        |  |                            |                                   |                      |                      |                      |                      |                      |                      |                      |         |
| Total |                               |                                      |                        |  |                            | 4.515                             | 4.741                | 4.978                | 6.011                | 0                    | 0                    | 0                    | 0                    |         |

|   |     |
|---|-----|
| Assumption: Annual increase in billed revenue | 5%  |
| Countrywide tariff increase in 2017           | 15% |

|  |
|--|
| Increase of WW tariff in Amman and other<br>Governorates |
|--|

Variables

| Ref.-no.                             | Action taken   | 7-May-14  | 7-May-14  | Effective                             | 1-Jul-14  |
|--------------------------------------|--|---|---|---------------------------------------|-----------|
| A6                                   | 25% of<br>Current<br>Amman WW<br>Tariff, 15% of<br>other<br>Governorate<br>WW Tariff | 25% of Current<br>Amman WW<br>Tariff, 15% of<br>other<br>Governorate<br>WW Tariff | 25% of Current<br>Amman WW<br>Tariff, 15% of<br>other<br>Governorate<br>WW Tariff |                                       |           |
| Company<br>/Governorate              | Actual   | Actual  | Actual  |                                       | Estimated |
|                                      | 2013   | 2014  | 2015  | Incremental<br>increase 2013-<br>2015 | 2016      |
|                                      | JOD  | JOD   | JOD   |                                       | JOD       |
| Amman Water<br>Company<br>(Miyahuna) | 16.664.001   | 19.115.468  | 21.258.132  | 4.594.131                             |           |
| Madaba<br>Water<br>Governorate       | 618.231  | 689.451   | 712.124   | 93.893                                |           |
| Zarqa Water<br>Governorate           | 1.985.144  | 2.613.548   | 2.904.154   | 919.010                               |           |
| Aqaba Water<br>Company               | 2.125.648  | 2.271.067   | 2.938.789   | 813.141                               |           |
| Alyarmouk<br>Water<br>Company        | 2.099.623  | 2.961.333   | 3.244.415   | 1.144.792                             |           |
| Water<br>Authority of<br>Jordan      | 3.124.518  | 4.113.512   | 4.590.049   | 1.465.531                             |           |
| Total                                | 26.617.165   | 31.764.379  | 35.647.663  | 9.030.498                             | 0         |

## Annex A 20

### Adjust wastewater reuse charges

| Item  | Project  | Funding agency, if any | Year of enforcement | Details  | Source of Information | Re-use water sold<br>[m3/a] | Cost reduction/ Increased Revenue |                 |                 |                 |                 |                 |                 |                 | Remarks |
|-------|--|------------------------|---------------------|--|-----------------------|-----------------------------|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|
|       |  |                        |                     |  |                       |                             | 2015<br>[JOD/a]                   | 2016<br>[JOD/a] | 2017<br>[JOD/a] | 2018<br>[JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |         |
|       | Wastewater re-use YWC Wadi Arab system, average flow 8.4 MCM/a | KfW                    | 2017                | Increase from 0.01 to 0,05 JOD/m3, 50% of qties sold | Gitec Design report   | 5.600.000                   |                                   |                 | 224             |                 |                 |                 |                 |                 |         |
|       | Reuse WWTP South Amman   |                        | 2021                |  |                       |                             |                                   |                 |                 |                 |                 |                 |                 |                 |         |
|       |  |                        |                     |  |                       |                             |                                   |                 |                 |                 |                 |                 |                 |                 |         |
|       |  |                        |                     |  |                       |                             |                                   |                 |                 |                 |                 |                 |                 |                 |         |
|       |  |                        |                     |  |                       |                             |                                   |                 |                 |                 |                 |                 |                 |                 |         |
| Total |  |                        |                     |  |                       | 5.600.000                   | 0                                 | 0               | 224             | 0               | 0               | 0               | 0               | 0               |         |

Increase Wastewater charges from 0.01 to 0.05 JOD/m3

| Ref.-no.                  | Action taken             | 29-Nov-15                         | Effective | 30-Nov-15 |
|---------------------------|--------------------------|-----------------------------------|-----------|-----------|
| A20                       | Wastewater reuse charges | Increase from 0.01 to 0.05 JOD/m3 |           |           |
| Company /Governorate      | Actual                   | Actual                            | Actual    | Estimated |
|                           | 2013                     | 2014                              | 2015      | 2016      |
|                           | JOD                      | JOD                               | JOD       | JOD       |
| Water Authority Of Jordan | 43445                    | 13598                             | 14485     |           |
| Total                     | 43445                    | 13598                             | 14485     |           |

Note : according to the action the expected amount to be collected from increasing the wastewater charges for the year 2017 (600)Six hundred thousand (dinars,this relay on number of agreements to be signed and consumption for irrigation specially from South Amman Wastewater plant. ( need discusstion )

Annex A 21

Reduction of apparent water losses (administrative losses)

| Item  | Project  | Funding agency | Year of enforcement<br>t | Details   | Source of Information | Water production 2015 | NRW | Additional billing | Revenue improvement | Additional revenue   |                      |                      |                      |                      |                      |                      |        | Remarks                             |
|-------|--|----------------|--------------------------|---|-----------------------|-----------------------|-----|--------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--------|-------------------------------------|
|       |  |                |                          |   |                       | [cbm/a]               | [%] | [cbm/a]            | [1,000 JOD/a]       | 2015<br>[1000 JOD/a] | 2016<br>[1000 JOD/a] | 2017<br>[1000 JOD/a] | 2018<br>[1000 JOD/a] | 2019<br>[1000 JOD/a] | 2020<br>[1000 JOD/a] | 2021<br>[1000 JOD/a] |        |                                     |
| 1     | Water Management Initiative (WMI)                        | USAID          | 2017-2020                |   | WAI                   | 63.862.714            | 61  | 2.314.002          | 3.471               |                      |                      |                      | 3.471                |                      |                      |                      |        | Ongoing contract                    |
| 2     | FARA Miyahuna  | USAID          | 2018/19                  | NRW reduction   | PMU                   | 183.316.615           | 37  | 4.212.066          | 6.318               |                      |                      | 0                    | 0                    | 6.318                | 0                    | 0                    | 0      | Under implementation                |
| 3     | Water meter placement in several governorates            | KfW/ USAID     | 2017-2021                | Replacement of broken domestic water meters   | PMU                   |                       |     | 26.400.000         | 39.600              |                      |                      |                      |                      |                      | 4.950                | 6.600                | 28.050 | under procurement                   |
| 4     | FARA Aqaba   | USAID          | 2021                     | NRW reduction   | PMU                   | 23.736.095            | 27  | 432.590            | 649                 |                      |                      |                      |                      |                      |                      | 0                    | 649    |                                     |
| 5     | Water management Balqa                                   | GIZ            | 2019/20                  |   | PMU                   | 35.208.000            | 62  | 1.414.517          | 2.122               |                      |                      |                      |                      |                      | 530                  | 530                  | 1.061  | Project appraisal under preparation |
| 6     | NRW reduction concentrating on YWC and Balqa governorate | GIZ            | 2019-21                  | Paradigm shift to performance based contracting in NRW reduction, water meter replacement | GIZ                   | 119.770.514           | 52  | 3.531.314          | 5.297               |                      |                      |                      |                      |                      | 1.324                | 2.648                | 1.324  | Start in 2017                       |
| Total |  |                |                          |   |                       | Average NRW           | 27  | 38.304.488         | 57.457              | 0                    |                      | 0                    |                      | 3.471                | 6.318                | 6.805                | 9.779  | 31.084                              |

Assumption: Reduction targets to be estimated and based on actually funded projects

| Utility/ WAI Governorate                     | Percent of distribution network covered by projects |                          |
|--|---|--------------------------|
| Miyahuna                                     | 40%   | <div></div> Variables    |
| Zarqa  | 40%   |                          |
| Aqaba Water Company                          | 40%   |                          |
| Yarmouk Water Company                        | 30%   |                          |
| Balqa  | 40%   |                          |
| Yarmouk Water Company/ Balqa Gov.            | 35%   |                          |
| Water meter replacement                      | 440.000   |                          |
| Additional billing in cbm per replaced meter | 60  |                          |
| Target NRW in 2021                           | 38%   |                          |
| Targetted reduction (5 years)                | 13,5%   |                          |
| Annual growth in water production            | 5%  |                          |
| Average sales price per cbm                  | 1,5 JOD   |                          |
|  |   |                          |
| Overall NRW figures                          | Water produced                                      | 2015<br>441.310.163      |
|  | Water sold  | 2020<br>551.637.704 m3/a |
|  | NRW in m3   | 213.851.788              |
|  | NRW in %  | 267.314.735 m3/a         |
|  | NRW in JOD  | 227.458.375              |
| Average sales price                          | NRW in %  | 51,5                     |
|  | NRW in JOD  | 51,5 %                   |
| Saving potential                             | Target NRW in 2020                                  | 341.187.563              |
|  | Targetted reduction                                 | 426.484.453 JOD/a        |
|  | in m3   | 1,5 JOD/m3               |
|  | in JOD  |                          |

## Annex B 1

### Cost savings due to improved energy efficiency

| Item  | Project                                     | Funding agency | Year of enforcement | Details  | Source of Information                         | Energy saving<br>[kWh/a] | Cost reduction  |                 |                 |                |                 |                 |                 |                 | Remarks                             |
|-------|---|----------------|---------------------|--|---|--------------------------|-----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|-------------------------------------|
|       |   |                |                     |  |   |                          | 2015<br>[JOD/a] | 2016<br>[JOD/a] | 2017<br>[JOD/a] | 2018<br>JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |                                     |
| 1     | Wala-Libb pump operations outsourcing       | GIZ/EBRD       | 2014                | Installation of new pumps and operation of Wala-Libb PS on performance based contract                            | GIZ   | 7.195.708                | 300.000         | 0               | 0               | 0              | 0               | 0               | 0               | 0               | Ongoing contract                    |
| 2     | WWTP Wadi Shalala                           | KfW            | 2016                | CHP plant 500 KW to utilize digester gas, capacity factor 80%  | YWC Sewerage Deptt.                           | 3.504.000                |                 | 108.694         | 108.694         | 115.632        | 0               | 0               | 0               | 0               | Start of operation August 2016      |
| 3     | Energy Efficiency Programme I               | KfW            | 2018                | Replacement of pumps & rehabilitation of 79 wells  | Contract documents Pumps/ well rehabilitation | 34.819.288               |                 |                 |                 | 4.630.965      | 0               | 0               | 0               | 0               | Contracts awarded                   |
| 4     | WWTP Irbid Central + Wadi Arab digesters    | KfW            | 2019                | Introduction anaerobic sludge stabilization +CHP, Energy saving Central Irbid 22.65 MWh/a, Wadi Arab 34.43 MWh/a | Climate change conceptual design report       | 57.080.000               |                 |                 |                 |                | 7.591.640       | 0               | 0               | 0               | Consulting services tendered        |
| 5     | Energy Efficiency Programme II              | KfW            | 2020                | Gravity supply switch in Madaba with elimination of pumping stations   | KfW Assessment report Sept.2015               | 11.786.432               |                 |                 |                 |                |                 | 1.567.595       | 0               | 0               | EUR 24 million KfW share            |
| 6     | Energy Efficiency Programme III             | KfW            | 2022                | Restructuring networks, WWTP anaerobic sludge stabilization & digesters  | KfW Assessment report Aug. 2016               | 22.000.000               |                 |                 |                 |                |                 |                 | 2.926.000       |                 | Project appraisal under preparation |
| 7     | Improving energy efficiency in water supply | GIZ            | 2018                | Introduction of regular energy audits  | GIZ   | 4.000.000                |                 |                 |                 |                | 500.000         | 1.000.000       | 2.000.000       |                 |                                     |
| Total |   |                |                     |  |   | 140.385.428              | 300.000         | 108.694         | 108.694         | 4.746.597      | 8.091.640       | 2.567.595       | 4.926.000       | 0               |                                     |

|   | 1 Feb 2010<br>to 30 Jun<br>2011 | 1 Jul 2011 to<br>28 May 2012 | 29 May 2012<br>to 14 Aug<br>2013 | 15 Aug 2013<br>to 31 Dec<br>2013 | 1 Jan 2014<br>to 31 Dec<br>2014 | 1 Jan 2015<br>to 31 Dec<br>2015 | 1 Jan 2016<br>to 31 Dec<br>2016 | 1 Jan 2017<br>to 31 Dec<br>2017 | 1 Jan 2018<br>to 31 Dec<br>2018 | 1 Jan 2019<br>to 31 Dec<br>2019 | 1 Jan 2020<br>to 31 Dec<br>2020 | 1 Jan 2021<br>to 31 Dec<br>2021 | 1 Jan 2022<br>to 31 Dec<br>2022 |
|---|---------------------------------|------------------------------|----------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Planned<br>Increase 2013<br>[Fils / kWh]                      | 42                              | 54                           | 66                               | 76                               | 87                              | 100                             | 115                             | 133                             | 133                             | 133                             | 133                             | 133                             | 133                             |
| Percentage  |                                 | 28.6%                        | 22.2%                            | 15.2%                            | 14.5%                           | 14.9%                           | 15.0%                           | 15.7%                           | 0%                              | 0%                              | 0%                              | 0%                              | 0%                              |
| Actual<br>+expected<br>Increase after<br>2018<br>[Fils / kWh] |                                 | 54                           | 66                               | 76                               | 87                              | 94                              | 94                              | 94                              | 100                             | 100                             | 105                             | 105                             | 105                             |
| Actual Increase   |                                 | 28.6%                        | 22.2%                            | 15.2%                            | 14.5%                           | 8%*                             | 0%*                             | 0%*                             | 6.4%**                          | 0%**                            | 5%**                            | 0%**                            | 0%**                            |

\* Postponing planned tariff increase due to reduced oil prices

\*\* Expected tariff increase to 100Fils/kWh in 2018, and to 105 Fils/kWh in 2020 from 2018 onwards

Annex B 2

Reduction of technical water losses (real losses)

| Item  | Project   | Funding agency | Year of enforcement | Details   | Source of Information | Water production 2015 | NRW | Water saving (at year of enforcement) | Cost reduction | Cost reduction       |                      |                      |                      |                      |                |                      | Remarks                             |
|-------|---|----------------|---------------------|---|-----------------------|-----------------------|-----|---------------------------------------|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------|----------------------|-------------------------------------|
|       |   |                |                     |   |                       | [cbm/a]               | [%] | [cbm/a]                               | [1,000 JOD/a]  | 2015<br>[1000 JOD/a] | 2016<br>[1000 JOD/a] | 2017<br>[1000 JOD/a] | 2018<br>[1000 JOD/a] | 2019<br>[1000 JOD/a] | 2020<br>[1000] | 2021<br>[1000 JOD/a] |                                     |
| 1     | MCA Jordan  | US-MCC         | 2017                | Restructuring and rehabilitation of water network in Zarqa & Ruseifeh               | MCA Jordan            | 63.862.714            | 61  | 3.471.002                             | 5.207          |                      |                      |                      | 5.207                |                      |                |                      | Ongoing contract                    |
| 2     | FARA Miyahuna   | USAID          | 2018/19             | Water loss reduction  | PMU                   | 183.316.615           | 37  | 5.265.082                             | 7.898          |                      | 0                    | 0                    | 3.949                | 3.949                | 0              | 0                    | Under implementation                |
| 3     | Water loss reduction middle governorates  | KfW            | 2018                | Water loss reduction Madaba/ Balqa governorates                                     | WAJ                   | 43.996.825            | 58  | 1.188.508                             | 1.783          |                      |                      |                      | 891                  | 891                  | 0              | 0                    | Ongoing contracts                   |
| 4     | Water loss reduction Balqa  | JICA           | 2019/20             | Network rehabilitation Ain Basha  | WAJ                   | 35.208.000            | 62  | 1.060.887                             | 1.591          |                      |                      |                      |                      | 796                  | 796            |                      | Start in 2017                       |
| 5     | Water loss reduction Karak governorate  | KfW            | 2017/18             | Rehabilitation of distribution networks   | WAJ                   | 21.676.000            | 69  | 969.177                               | 1.454          |                      |                      |                      |                      | 1.454                | 0              |                      | Ongoing contracts                   |
| 6     | Improved access to water, water distribution performance and related sewerage disposal in Irbid Governorate (YWC) | AFD/ KfW       | 2019/20             | Restructuring/ rehabilitation of water supply network in Greater Irbid/ Ramtha area | PMU                   | 84.562.514            | 47  | 3.219.295                             | 4.829          |                      |                      |                      |                      | 2.414                | 2.414          | 0                    | Consulting services tendered        |
| 7     | FARA Aqaba  | USAID          | 2021                | Water loss reduction  | PMU                   | 23.736.095            | 27  | 432.590                               | 649            |                      |                      |                      |                      |                      | 0              | 649                  |                                     |
| 8     | Water management Balqa  | GIZ            | 2019/20             | Pressure management/ Active leakage control   | PMU                   | 35.208.000            | 62  | 1.768.146                             | 2.652          |                      |                      |                      |                      | 663                  | 663            | 1.326                | Project appraisal under preparation |
| 9     | NRW reduction concentrating on YWC and Balqa governorate  | GIZ            | 2019-21             | Paradigm shift to performance based contracting in NRW reduction                    | GIZ                   | 119.770.514           | 52  | 3.531.314                             | 5.297          |                      |                      |                      |                      | 1.324                | 2.648          | 1.324                | Start in 2017                       |
| Total |   |                |                     |   |                       | Average NRW           | 53  | 20.906.003                            | 31.359         | 0                    | 0                    | 0                    | 10.047               | 11.491               | 6.522          | 3.299                |                                     |

Assumption: Reduction targets to be estimated and based on actually funded projects

| Utility/ WAJ Governorate          | Percent of distribution network covered by project | Variables | Overall NRW figures | Water produced            | 2015        | 2020              |
|-----------------------------------|--|-----------|---------------------|---------------------------|-------------|-------------------|
| Miyahuna                          | 50%  |           |                     |                           | 441.310.163 | 551.637.704 m3/a  |
| Zarqa                             | 60%  |           |                     |                           | 213.851.788 | 267.314.735 m3/a  |
| Aqaba Water Company               | 40%  |           |                     |                           | 227.458.375 | 284.322.969 m3/a  |
| Yarmouk Water Company             | 50%  |           |                     |                           | 51,5        | 51,5 %            |
| Madaba/ Balqa                     | 30%  |           |                     |                           | 341.187.563 | 426.484.453 JOD/a |
| Balqa alone                       | 50%  |           |                     |                           | 1,50        | 1,5 JOD/m3        |
| Karak                             | 40%  |           |                     |                           |             |                   |
| Yarmouk Water Company/ Balqa Gov. | 35%  |           |                     |                           |             |                   |
| Target NRW in 2021                | 38%  |           |                     | Target NRW in 2           | 38,0        | 38,0 %            |
| Targetted reduction (5 years)     | 13,5%  |           |                     | Targetted reduction in m3 | 13,5        | 13,5 %            |
| Annual growth in water production | 5%   |           |                     | in JOD                    | 30.706.881  | 38.383.601        |
|                                   |  |           |                     |                           | 46.060.321  | 57.575.401        |



Annex B 3

Automation of water systems operations

| Item  | Project  | Funding agency | Year of enforcement | Details  | Source of Information | Water saving | Energy saving | Cost reduction |               | Cost reduction |              |              |              |              |              |              | Remarks                    |
|-------|--|----------------|---------------------|--|-----------------------|--------------|---------------|----------------|---------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------------------|
|       |  |                |                     |  |                       |              |               | Water          | Energy        |                |              |              |              |              |              |              |                            |
|       |  |                |                     |  |                       | [cbm/a]      | [kWh/a]       | [1,000 JOD/a]  | [1,000 JOD/a] | 2015           | 2016         | 2017         | 2018         | 2019         | 2020         | 2021         |                            |
|       |  |                |                     |  |                       |              |               |                |               | [1000 JOD/a]   | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] | [1000 JOD/a] |                            |
| 1     | SCADA system Yarmouk Water Company                                       | Spanish Govt.  | 2017                | Design and installation of SCADA system incl. Hardware in YWC service area   | PMU/YWC               | 1.691.250    | 3.025.885     | 2.537          | 402           |                |              |              |              |              | 2.939        |              | Ongoing contract           |
| 2     | Technical Assistance in analysing and optimising water system operations | AFD/ KfW       | 2018/19             | Design and implementation of analysis module for SCADA operations data and support for optimization of rationing schedule & water operations | PMU                   | 845.625      | 3.025.885     | 1.268          | 402           |                | 0            | 0            | 835          | 835          | 0            | 0            | Start in 2018              |
| 2     | Scada updating Miyahuna  | USAID          | 2018/19             | Modernization of existing SCADA and optimization of rationing schedule & water operations  | PMU                   | 1.833.166    | 6.447.424     | 2.750          | 858           |                |              |              |              | 1.804        | 1.804        | 0            | Contract under preparation |
| 3     | SCADA system Zarqa Governorate   | USAID          | 2019/20             | Design and installation of SCADA system incl. Hardware in Zarqa governorate  | PMU                   | 1.277.254    | 937.087       | 1.916          | 125           |                |              |              |              | 1.020        | 1.020        |              | Start in 2017              |
| Total |  |                |                     |  |                       |              |               | 8.471          | 1.787         | 0              | 0            | 0            | 835          | 3.659        | 5.763        | 0            |                            |

Assumption: Reduction targets to be estimated and based on actually funded projects

| Utility/ WAJ Governorate          | Percent of water saving through automation projects | Percent of energy saving through automation projects |
|-----------------------------------|---|--|
| Miyahuna                          | 1,0%  | 1,0%   |
| Zarqa                             | 2,0%  | 1,0%   |
| Yarmouk Water Company             | 2,0%  | 1,0%   |
| Cost per cbm of water in JOD      | 1,5   |  |
| Electricity tariff per kWh in JOD |   | 0,133  |

Water produced 2015:

|                       |             |      |
|-----------------------|-------------|------|
| Miyahuna              | 183.316.615 | m3/a |
| Zarqa                 | 63.862.714  | m3/a |
| Yarmouk Water Company | 84.562.514  | m3/a |

Energy consumption 2015

|                       |             |       |
|-----------------------|-------------|-------|
| Miyahuna              | 644.742.415 | kWh/a |
| Zarqa                 | 93.708.702  | kWh/a |
| Yarmouk Water Company | 302.588.457 | kWh/a |

Variables

| Electricity Tariff and consumption for Water Authority and its Subsidiaries for 2015 |                         |                   |             |
|--|-------------------------|-------------------|-------------|
| Governorate/ Company   |                         | Consumption kWh/a | Amount JOD  |
| 0,094  | Albalqa                 | 45.588.426        | 4.285.312   |
| 0,094  | Al karak                | 85.761.468        | 8.061.578   |
| 0,094  | Ma'an                   | 20.150.213        | 1.894.120   |
| 0,094  | Al tafelah              | 19.714.500        | 1.853.163   |
| 0,094  | Head Quarter            | 5.431.043         | 510.518     |
| 0,094  | Zarqa                   | 93.708.702        | 8.808.618   |
| 0,094  | Madaba                  | 30.199.457        | 2.838.749   |
| 0,094  | Amman Water             | 644.742.415       | 60.605.787  |
| 0,094  | Alyarmouk Water Company | 302.588.457       | 28.443.315  |
| 0,094  | Aqaba Water             | 33.157.298        | 3.116.786   |
|  | Total                   |                   | 120.417.946 |
| 0,094  | As Samar                | 12.326.809        | 1.158.720   |
| 0,094  | Disi Water Project      | 321.320.617       | 30.204.138  |
|  | Grand Total             | 151.780.804       | 151.780.804 |

Annex B 4

Gravity supply Mafraq area - reduction of energy consumption

| Item  | Project               | Funding agency | Year of enforcement | Details  | Source of Information | Energy saving | Energy saving | Cost reduction       |                      |                      |                      |                      |                |                      | Remarks                              |
|-------|-----------------------|----------------|---------------------|--|-----------------------|---------------|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------|----------------------|--------------------------------------|
|       |                       |                |                     |  |                       | [kWh/a]       | [1,000 JOD/a] | 2015<br>[1000 JOD/a] | 2016<br>[1000 JOD/a] | 2017<br>[1000 JOD/a] | 2018<br>[1000 JOD/a] | 2019<br>[1000 JOD/a] | 2020<br>[1000] | 2021<br>[1000 JOD/a] |                                      |
| 1     | Aqeb conveyor project | KfW            | 2018                | Supply part of Mafraq city plus surrounding villages by gravity from upper Aqeb wells, stop old Za'atary pumping station | PMU/YWC               | 5.571.360     | 741           |                      |                      |                      | 741                  |                      |                |                      | Design ongoing, construction in 2017 |
| Total |                       |                |                     |  |                       | 5571360       | 741           | 0                    | 0                    | 0                    | 741                  | 0                    | 0              | 0                    |                                      |

Assumption: No increase in electricity tariff until 2018

| Utility/ Village   |  | Energy saving in kWh/a by reinforcing pipeline dia & using DN 400 to Mafraq by gravity | Variables |  |
|--|--|--|-----------|--|
| Stop pumping from Za'atary to Sumaya PS, utilize existing DN 400 |  | 3.363.840  |           |  |
| Reinforce pipeline to Througat Al Joub and Baj                   |  | 1.576.800  |           |  |
| SEZ/ American Hospital Al Bayt University                        |  | 192.720  |           |  |
| Al Nasreiyeh& Al Manshiyah                                       |  | 438.000  |           |  |
| Total  |  | 5.571.360  |           |  |
| Electricity tariff per kWh in JOD                                |  | 0.133  |           |  |

Annex B 5

Cost Savings due to introduction of renewable energy usage in WAJ

| Item  | Project   | Funding agency | Year of enforcement | Details   | Source of Information               | Energy production<br>[MWh/a] | Cost reduction  |                |                 |                 |                 |                 | Remarks |
|-------|---|----------------|---------------------|---|-------------------------------------|------------------------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|---------|
|       |   |                |                     |   |                                     |                              | 2017<br>[JOD/a] | 2018<br>JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |         |
| 1     | Ma'an windfarm 80 MW                                      | BOT            | 2017                | 80 MW, capacity factor 30%, WAJ benefit 0.133-0.03= 0.103 JOD/kWh based on 2017 planned tariff                    | PMU                                 | 210.240                      | 16.241.040      | 5.413.680      | 0               | 0               | 0               | 0               |         |
| 2     | Small HPP on Abu Alanda-Khaw pipeline                     | AFD            | 2018                | 2 HPP to utilize pressure difference between Abu Alanda and Khaw, operating cost 0.01 JOD/kWh, net metering model | PMU Conceptual design report Safege | 18.000                       |                 |                | 2.214.000       | 0               | 0               | 0               |         |
| 3     | PV in 4 selected Pumping Stations 15 MW                   | EU             | 2019                | 15MW, capacity factor 20%, net metering approach, O&M cost 0.01 JOD/kWh   | PMU Feasibility study OST Energy    | 26.280                       |                 |                | 3.232.440       | 0               | 0               | 0               |         |
| 4     | Dhluiei solar PV 50MW                                     | BOT            | 2020                | 50 MW+25MW optional, capacity factor 20%, WAJ benefit 0.054 JOD/kWh, network losses 2.3%                          | PMU                                 | 131.400                      |                 |                |                 | 12.220.200      | 0               | 0               |         |
| 5     | Gweirah PV farm 80 MW                                     | BOT            | 2018/2019           | 80 MW, capacity factor 20%, WAJ benefit 0.054 JOD/kWh, network losses 2.3%  | PMU                                 | 136.936                      |                 | 6.367.539      | 6.367.539       |                 |                 |                 |         |
| 6     | Nexus programme HPP Wadi Arab re-use system               | KfW            | 2019                | 1 HPP with 2 MW, annual estimated electricity output 5800 MWh/a, net metering model                               | PMU Final Design report Gitec       | 5.800                        |                 |                | 713.400         | 0               | 0               | 0               |         |
| 7     | Energy supply for Host Communities and Syrian Refugees II | KfW            | 2020                | Photovoltaic power generation 25 MW, 50 % of production benefitting water sector                                  | German BMZ/ MWI                     | 40.000                       |                 |                |                 | 3.720.000       |                 |                 |         |
| Total |   |                |                     |   |                                     | 568.656                      | 16.241.040      | 11.781.219     | 12.527.379      | 15.940.200      | 0               | 0               |         |

|   | 1 Feb 2010 to 30 Jun 2011 | 1 Jul 2011 to 28 May 2012 | 29 May 2012 to 14 Aug 2013 | 15 Aug 2013 to 31 Dec 2013 | 1 Jan 2014 to 31 Dec 2014 | 1 Jan 2015 to 31 Dec 2015 | 1 Jan 2016 to 31 Dec 2016 | 1 Jan 2017 to 31 Dec 2017 | 1 Jan 2018 to 31 Dec 2018 | 1 Jan 2019 to 31 Dec 2019 | 1 Jan 2020 to 31 Dec 2020 | 1 Jan 2021 to 31 Dec 2021 | 1 Jan 2022 to 31 Dec 2022 |
|---|---------------------------|---------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Planned Increase 2013 [Fils / kWh]                | 42                        | 54                        | 66                         | 76                         | 87                        | 100                       | 115                       | 133                       | 133                       | 133                       | 133                       | 133                       | 133                       |
| Percentage  |                           | 28.6%                     | 22.2%                      | 15.2%                      | 14.5%                     | 14.9%                     | 15.0%                     | 15.7%                     | 0%                        | 0%                        | 0%                        | 0%                        | 0%                        |
| Actual +expected Increase after 2018 [Fils / kWh] |                           | 54                        | 66                         | 76                         | 87                        | 94                        | 94                        | 94                        | 100                       | 100                       | 105                       | 105                       | 105                       |
| Actual Increase                                   |                           | 28.6%                     | 22.2%                      | 15.2%                      | 14.5%                     | 8%*                       | 0%*                       | 0%*                       | 6.4%**                    | 0%**                      | 5%**                      | 0%**                      | 0%**                      |

\* Postponing planned tariff increase due to reduced oil prices  
\*\* Expected tariff increase to 100Fils/kWh in 2018, and to 105 Fils/kWh in 2020 from 2018 onwards

## Annex B 6

### Reduction of personnel costs

|   | Action taken                           | Jul-16                    | Effective                          |
|---|--|---------------------------|------------------------------------|
| B6  | Reduction of personnel costs(WAJ only) | 150 employees/year        | Estimated cost reduction pear year |
| Assumption  |  | Estimated costs reduction |                                    |
|   | No.of employees/Cost/Average           | 2016                      | 2017                               |
|   |  | [JOD]                     | [JOD]                              |
| Number of employees (A)   | 3.200                                  |                           |                                    |
| Personnel Cost JOD /year(B)   | 28.000.000                             |                           |                                    |
| Average personnel cost JOD/Year (C) =(B/A)                          | 8.750                                  |                           |                                    |
| Monthly average personnel cost per employee JOD/Monthly (D) =(C/12) | 729                                    |                           |                                    |
| Retirement of 150 employees yearly (E) =(D*12*150)                  | 1.312.500                              |                           |                                    |
| Retirement o f150 employees yearly (E) =(D*12*150)                  |  |                           | 1.312.500                          |
| Total (JOD)   |  |                           | 1.312.500                          |

*Note : Reduction of personnel cost will be achieved by suspending recruitment of employees and the effect is expected to be on 2017*

Annex B 7

Use of alternative energy sources to reduce electricity costs

| Item  | Project  | Funding agency | Year of enforcement | Details   | Source of Information | Energy production<br>[MWh/a] | Cost reduction  |                 |                 |                 |                 |                 | Remarks |
|-------|--|----------------|---------------------|---|-----------------------|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|
|       |  |                |                     |   |                       |                              | 2017<br>[JOD/a] | 2018<br>[JOD/a] | 2019<br>[JOD/a] | 2020<br>[JOD/a] | 2021<br>[JOD/a] | 2022<br>[JOD/a] |         |
| 1     | Supply of natural gas from mediterranean sources | NN             | 2020                | Expected reduction of electricity tariff by 25% | MWI                   | 1.095.951                    |                 |                 |                 | 25.508          | 10.932          |                 |         |
| Total |  |                |                     |   |                       |                              | 0               | 0               | 0               | 25.508          | 10.932          | 0               |         |

Assumption:

|                                 |     |
|---------------------------------|-----|
| Electricity tariff reduction    | 25% |
| [%]                             | 3   |
| Electricity tariff [Fils / kWh] | 133 |

WAJ electricity consumption 2015 1.280.000 MWh/a  
WAJ electricity consumption 2020 1.483.871 MWh/a  
Production from renewable sources by 2020 387.920 MWh/a  
Net energy supply from distribution companies: 1.095.951 MWh/a