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WATER REUSE AND ENVIRONMENTAL CONSERVATION PROJECT

CONTRACT NO. EDH–I–00–08–00024–00 ORDER NO. 04

AQABA WATER REUSE FINANCIAL PLANNING ASSISTANCE

June 2015

IMPLEMENTED BY AECOM

WATER REUSE AND ENVIRONMENTAL CONSERVATION PROJECT

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JUNE 2015

Submitted to:

USAID Jordan

Prepared by:

AECOM

Table of Contents

LIST OF ACRONYMS

ASEZA	Aqaba Special Economic Zone Authority
AWC	Aqaba Water Company
IT	Information Technology
JPMC	Jordan Phosphate Mining Company
KHIA	King Hussein International Airport
RW	Reused Water
WRECP	Water Reuse and Environmental Conservation Project
WW	Wastewater
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

The Government of Jordan (GOJ) recognizes the urgent need to protect and conserve scarce resources through regulation, education, and coordination with industry, local communities and the private sector. To address this need, the United States Agency for International Development (USAID) and the GOJ launched the Water Reuse and Environmental Conservation Project. The project supports the improvement of the regulatory environment; industry training and networking on pollution prevention and environmental management; landfill and "hot spot" rehabilitation; water reuse to support community livelihoods; and kingdom-wide biosolids management. The implementing contractor is AECOM. This five-year program consists of four tasks aimed at increased efficiency in the use of water and energy, and improved liquid and solid waste handling practices in the industrial sector of Jordan.

As part of Task 2, WRECP developed a reclaimed water tariff model for use by Aqaba Water Company (AWC) wastewater division. This report is to be read in conjunction with the Excel model developed by the WRECP.

The objectives of this report and the accompanying Excel model (see Attachment A) can be summarized in the following:

- Develop a systematic, cost-based methodology to pricing of reused water as opposed to case-by-case negotiated approach.
- Provide the various stakeholders (seller of reused water namely AWC, buyers of reused water as farms, new development projects, financiers of wastewater expansions as donors, banks) with a road map of future prices and projected cash flows.

A PowerPoint presentation on the model was given to Aqaba Water Company on 10 June 2015 (see Attachment B).

Data used in this report were obtained from AWC and are as follows:

- AWC trial balance for years 2010 - 2013
- AWC audited accounts for years 2010 - 2013
- AWC trial balance for August 2014
- Monthly wastewater influent and effluent volumes for period Jan 2008 - June 2014
- Electricity meters readings for periods Jan 2013 - June 2014

The structure of this report is as follows:

- Section 1.0 Background
- Section 2.0 Ponds Upgrading study
- Section 3.0 Reuse Water (RW) tariff model

Aqaba WWTP is composed of a natural and mechanical treatment processes with a capacity of 9,000 and 12,000 m^3/day respectively. Reclaimed water generated by the natural treatment (2013 actual 1.9 million m^3, 2014 est. 2.0 million m^3) goes mainly for irrigation by a number of ASEZA affiliates. Small amounts are consumed by Jordan TV and KHIA King Hussein International Airport) for landscaping purposes. On the other hand, reclaimed water generated by the mechanical process (2.7 million m^3 actual 2013 and est. 2014) is largely

consumed by JPMC (Jordan Phosphate Mining Company) for use in cooling towers with balance by ASEZA.

As a result of multitude of problems with the current natural treatment ponds, ranging from quality and quantity considerations, management sought solutions to address these issues in a technically and economically feasible way. Section 2 of this study will address this objective.

Due to the expected increase in Aqaba population growth to the tune of 2.7% p.a.[1] which will subsequently lead to increased volume of wastewater influents and treated wastewater, the need has risen to examine the tariff of reclaimed water in a way that achieves cost recovery.

Furthermore, the extraordinary demand on wastewater treatment services by new development projects soon to be launched in Aqaba as Ayla, Marsa Zayed and Saraya and the need to fund this expansion, highlighted the importance of allocating common treatment costs equitably among various developers.

Section 3 illustrates the tariff model which encompass capital, operating, financing costs and markup necessary to achieve AWC required return on equity.

2 Ponds Upgrading Study

For the purpose of upgrading the effluent quality of the natural treatment process, the WRECP team is recommending **a new aerated stabilization basin** as the best option to upgrade the quality and quantity of reused water.

The technical merits of each option are discussed in the report titled *Aqaba Natural Wastewater Treatment Plant*, submitted 10 June 2015. This report discusses only the financial benchmarks and cost estimates for the recommended options, the new aerated stabilization basin.

Table 2-1 illustrates the operational parameters and cost estimates under the recommended option:

Table 2-1. Operational Parameters and Cost Estimates

	Unit	Option 1
Type A water capacity	m^3/day	11,269
Influent volume at full capacity	million m^3	4.1
Annual Type A water sold (20% loss)	million m^3	3.3
Upgrade & Expansion capital cost	JD	8,120,000
Incremental electricity consumption	kwh/m^3	1.6
Additional headcount	No	4
Monthly basic salary per HC	JD/month	600
Incremental chlorine expense	JD/year	28k
Incremental Polymers expense	JD/year	330k
Maintenance rate	CAPEX %	0.53%
Straight-line depreciation rate	%	3.3%

[1] USAID Jordan Institutional Support & Strengthening Program ISSP - National Strategic Wastewater Master Plan Final Report p. 11.

Benefits / Basic salary	%	100.0%

Table 2-2 below highlights the annual operating costs under the recommended option on the basis of cost parameters above.

Table 2-2. Annual Operating Costs

	Unit	
Influent volume at full capacity	million m^3	4.1
Effluent volume	million m^3	3.3
Fixed Costs		
Asset recovery reserve	JD/year	135k
Maintenance reserve	JD/year	43k
Salaries & Benefits	JD/year	58k
Total Fixed costs	**JD/year**	**236k**
Variable costs		
Electricity	GWh/year	6.5
Electricity cost-2017	JD/kwh	0.133
Electricity cost-2017	JD/year	861k
Chlorine cost	JD/year	28k
Methanol cost	JD/year	330k
Total Variable costs	**JD/year**	**1,218k**
Annual direct cost	**JD/year**	**1.5 million**
Type A incremental cost at full capacity	**JD/m^3**	**0.442**

The investment parameters are summarized in Table 2-3 below, assuming operation at full capacity and investment horizon of 25 years.

Table 2-3. Investment Parameters

	Unit	
Equity NPV at 4.68%	million JD	2.4
Equity IRR	%	11%
Payback Period	Years	12.3

Table above illustrates an equity NPV higher than zero and an equity IRR at 11% that is higher than historical required return on equity of 4.68% and thus we conclude that the technically recommended option is financially viable and presents an addition to AWC shareholders value.

3 RW Tariff model

Below is a high level overview of the tariff process:

- Identification of relevant cost centers:
- Identification of relevant costs:
- Perform long term projections
- Determination of future wastewater influent flows

- Determination of base costs and projection of future escalation rates
- Determination of funding requirements and sources of funding
- Allocation of wastewater services result of operations
- Allocation of Distribution cost center expenses
- RW rate setting
- Illustration of current negotiated tariff structure
- Illustration of future cost-based tariff structure

The next sections present an in-depth view of each of the steps listed above.

3.1 Identification of relevant cost centers

The Wastewater division at AWC is composed of two main functions:

- Wastewater service and includes the following cost centers:
  - Lifting stations
  - Collection networks
- Reused water and includes the following cost centers:
  - Current Natural treatment
  - Upgraded Natural treatment - Type A water
  - Mechanical treatment - Type A water
  - Distribution networks

The definitions of reused water types A and B can be found in the Jordanian standard 893/2006 and its amendments.

3.2 Identification of relevant costs:

The following costs / resources are used in the production of reused water:

- Salaries & Benefits
- Equipment maintenance
- Other maintenance
- Overheads
- Assets recovery
- Replacement recovery
- Debt service
- Electricity
- Chemicals
- General Overheads

3.3 Long term projections

Under this step, long term projections that will drive the next parts of the model are prepared. Projection include, among others:

- Ordinary population growth
- new development occupancy growth
- expected demand of reused water by water type
- Required treatment capacity by water type
- Long term plans for expansion rollout

3.4 Future wastewater influent flows

Wastewater volumes are driven by Aqaba organic population growth as well as new development projects. Estimates for water discharge per capita are assumed to be constant as of end 2012 of 60 m3/capita/year. New development projects wastewater discharge is based on following estimates:

i. Ayla - 12,750 m3/day
ii. Marsa Zayed - 15,050 m3/day
iii. Saraya - 3,560 m3/day

3.5 Determination of base costs and projection of future escalation rates

2014 is assumed as the base year. Costs listed above in 3.3 are estimated as of end 2014 and projected for future periods using proper escalation rate. Variable costs as electricity and chemicals are allocated using historical allocation rates. Fixed costs are allocated based on an objective criteria as treatment capacity, time basis or assets acquisition value. Below are further details on projected escalation rates.

3.5.1 Salaries & Fringe Benefits

This item includes basic salaries and benefits of all employees who are directly involved in the wastewater division and other supporting employees from the divisions of laboratories and maintenance. Estimates regarding effort levels are made to allocate cost among cost centers listed above.
Salaries and benefits are assumed to be adjusted every three years at compounded long term rate of inflation, set at 3% p.a.

3.5.2 Equipment maintenance

This item includes maintenance for mechanical, electrical machinery and civil works. Annual maintenance is estimated as percentage of acquisition cost allocated to various cost centers, at the following rates:

- Civil works 0.1%
- Mechanical equipment 2.5%
- Electrical equipment 2.0%

3.5.3 Other maintenance

This item includes wastewater division non-operating maintenance expenditures as computer, furniture, office electrical and mechanical equipment maintenance. Expenses are allocated among various cost centers within the wastewater division according to relative weight of direct expenses and further indexed to inflation to project future expense.

3.5.4 Overheads

This item includes overheads directly attributable to wastewater division which includes vehicles repairs and maintenance, communications, stationery and other office expenses. Expenses are allocated among various cost centers within the wastewater division according to relative weight of direct expenses and further indexed to inflation to project future expense.

3.5.5 Asset Recovery

This item includes the annual assets recovery reserve of newly acquired assets calculated as acquisition cost less any capital assets contribution (defined as grants, property sewerage taxes, connection fees and CAPEX participation by new development projects) divided by assets useful life.

A detailed analysis of assets useful life was conducted by WRECP. Following is a summary of this analysis:

Civil works:

- Concrete works: 50 years

- Metal works: 15 years
- Pipe works: 20-50 years

Mechanical works:
- various: 15 - 40 years

Electrical works:
- Lighting system: 15 years
- Cabling: 50 years
- Other: 20 years

3.5.6 Replacement Recovery

This item includes the annual recovery reserve of replacement assets. Replacements are assumed to occur according to useful life schedules. Furthermore, asset replacements don't qualify for grants and thus full acquisition cost is amortized over assets useful life.

3.5.7 Debt Service

This item includes the financing costs of interest and loan fees attributable to new expansion projects which are driven mainly by ordinary population growth.
In the model, debt is assumed to be split in local and foreign currencies with different cost structure depending on the type of financing.

3.5.8 Electricity

This item includes the cost of electricity consumption incurred. Estimate of future consumption is variable by quantity of wastewater influent and is based on historical trends observed over the period 2010 - 2013. Future tariffs are based on government-approved tariff plan for the period 2013-2017 which was passed Jun 2013. For periods following 2017 tariffs are assumed to increase in accordance with general inflation levels.

3.5.9 Chemicals

This item includes the cost of chemicals used in the treatment process, mainly composed of chlorine, methanol and insecticides. Estimate of future consumption is variable by quantity of wastewater influent and is based on historical trends observed over the period 2010 - 2013. Although chemical prices been stable for long periods of time, this cost item is assumed to increase with inflation.

3.5.10 General Overheads

This item includes indirect costs incurred by support functions at AWC that are allocated to wastewater division. Allocation of general overheads involves the following steps:

- Define profit and cost centers. Namely the following are defined as profit centers:
  - Operational (Water)
  - Wastewater
  - Maan management contract
  - Wadi Mousa management contract
- On the other hand, the following are defined as cost centers
  - Administration
  - IT
  - Maintenance
  - Customer service
  - Quality control
- Analyze historical trends of overheads in cost centers. Salaries and fringe benefits of support functions compose 80% of overheads.

- Offset non-operating revenues (interest, lab fees, currency exchange,...) against overheads.
- Establish allocation ratios of general overheads to profit centers. In this model we choose to allocate general overheads on the basis of direct expenses incurred at profit centers.
- Overheads allocated to Wastewater division are further allocated to the cost centers in wastewater division listed under 4.2.
- Future growth of overheads is 80% based on salaries increases of 3% compounded every 3years and 20% on annual inflation adjustment.

3.6 Determination of funding requirements and sources of funding

Funding sources available for treatment expansion are as follows:

Connection fees. Connection fees are one-off charges levied by AWC on new properties connected to the sewerage network to compensate the company for the capital costs incurred to service the property. Calculation is mandated by law and is driven by property area in square meters and type of property (residential vs. commercial). Connection fees are JD 200k p.a.

Sewerage taxes. Sewerage taxes are collected by ASEZA on behalf of Ministry of Finance for properties registered in Aqaba city. Tax is based on the appraised value of property and for 2014 the tax is estimated at JD 450k p.a., increasing by inflation rate.

CAPEX participation by development projects. New development projects as Ayla, Marsa, Saraya are located outside the service area of AWC and thus servicing these projects by AWC wastewater treatment facilities requires a negotiated approach. Serving these new development projects with wastewater services (collection and lifting if required) and reused water (mechanical treatment and distribution) requires financial resources far greater than can be accommodated by AWC and thus participation by project developers in the capital costs required for wastewater services is imperative.
Upon application of sources listed above against funding required, any balance remaining is funded through:

Grants. AWC is a recipient of a USD 30m grant extended by USAID in 2006 - 2007 to fund 85% of the construction cost of the mechanical treatment facility, expansion of the existing natural treatment ponds as well as other lifting and collection projects. These grants help in reducing the reused water rate requirement.

Debt. The funding structure of AWC is assumed to hold reasonable levels of indebtedness in local as well as foreign currencies.

Equity. Amounts not funded by sources above are assumed to be covered by AWC internal cash flows.

The outcome of this stage feeds into the asset recovery and debt service costs to be recovered through the rate mechanism.

3.7 Allocation of wastewater services result of operations

Under this stage, costs allocated to the Lifting and Collection cost centers are offset against wastewater fees levied. Any resulting profit (loss) are further allocated to treatment cost centers (Natural Type A, Natural Type B and Mechanical Type A).
Wastewater fees are collected on customers' water bills and are estimated at JD2.5m p.a. but increasing by population growth rate.

3.8 Allocation of Distribution cost center expenses

Under this stage, costs accumulated in the Distribution cost center are further allocated to treatment cost centers (Natural and Mechanical).

3.9 RW rate setting

This stage involves the following steps:

- Aggregation of costs per cost center (water type)
- Apply an appropriate cost markup to accumulated costs
- Check against price of alternative sources of water (for the sake of AWC, potable water is considered the next best alternative to reclaimed water)
- Select a rate averaging approach as further discussed below

The profit margin to apply is the before-tax cost markup observed during the period 2010-2013 as reported in AWC audited accounts. The rationale is that the sale of reused water should be as profitable as other lines of business at AWC and thus the profit margin to be derived from sale of reused water should not be less than otherwise possible.

The revenues information in Table 3.1 is derived from AWC audited accounts for years 2010 - 2013.

Table 3.1 Revenues

	2010	2011	2012	2013	Average 2010-2013
Revenues	12,556,416	13,491,750	16,572,543	17,686,628	15,076,834
Expenses	10,946,506	12,043,677	14,747,732	15,526,554	13,316,117
Net income	1,609,910	1,448,073	1,824,811	2,160,074	1,760,717
Net income margin	12.82%	10.73%	11.01%	12.21%	11.68%
Cost markup after-tax	14.71%	12.02%	12.37%	13.91%	13.22%
Cost markup before-tax	15.48%	12.66%	13.02%	14.64%	**13.92%**

A cost markup of 13.92% is applied in this model to arrive at targeted price.

Next, targeted price derived from step above, is compared against the price of potable water, given the fact that potable water (compared to underground or desalinated water) is the most economic substitute to reclaimed water. As of date of this report the price of potable water for industrial uses is JD 1.0 per m^3 and is considered the ceiling price of reclaimed water.

Then a rate averaging mechanism is applied to resultant tariff. Historically AWC has signed three-year contracts with the reclaimed water customers. The Consultant suggest adopting a 3-year averaging approach with no reduction in tariff. I.e. if the calculated tariff of any given 3-year period is lower than the previous tariff, there will be no tariff adjustment. Given the fact that the majority of costs are fixed in nature, applying this approach with water quantities increasing will result in profit margins higher than planned.

While the Consultant recommends the above approach, the model is flexible to accommodate other types of rate averaging mechanisms including the following:

- Annual tariff re-setting. This approach results in exact profit margins as planned. However the administration can be difficult as customers require visibility on prices for periods longer than 1 year.

- 3-year tariff re-setting with possibility for rate reduction. While this approach results in profit margins closer to the target, a downward trend might send wrong price signals to customers.

- User-defined tariff. This approach can be used for testing certain rate scenarios and evaluating effect on profits and cash flows.

3.10 Illustration of current negotiated tariff structure

In this section we present a comparison of reused water rate under the current negotiated tariff structure as opposed to a cost-based tariff structure using the data of 2014.

Table 3-2 presents proforma 2014 results of operation for reused water sales.

Table 3.2 Proforma 2015 Results for Reused Water Sales

Fils/m^3	Natural existing	Natural Pro forma	Mechanical existing	Mechanical Pro forma
Selling price	103	271	711	612
Cost	(238)	(238)	(538)	(538)
Profit (loss)	**(135)**	**33**	**173**	**74**
Profit (loss) % of cost	**(56.7%)**	**13.9%**	**32.2%**	**13.9%**

The following can be inferred from table above:

- The negotiated price of reused water from the natural system is well below cost recovery levels. This water is used predominantly for irrigation purposes and is sold at 100 fils/m^3. Minor volumes (projected around 18,000 m^3 in 2014) are sold to KHIA at 250 fils/m^3 with a floor of 2,500 m^3 monthly. This contrasts with a cost-based rate of 271 fils/m^3. As a result the natural system on standalone basis is expected to realize losses.

- On the other hand, the mechanical system effluent is sold at levels that far surpass the cost recovery rate. This is mainly driven by reused water sales to JPM which are priced at JD 1 per m^3, same price as potable water given the fact the mechanical system effluent is treated to very high quality level which justifies the high price and profit margin. Significant volumes of mechanical system effluent is sold also to ASEZA although at prices lower than JPM resulting in blended selling rate of 711 fils/m^3, higher than a cost-based tariff of 612.

- The overall results of operation is positive as the high margin achieved on the mechanical system effluent compensates for the losses realized on the natural system. Nevertheless a cost-based rate structure will outperform the current rate arrangement by at least 30% if implemented. Understandably implementing a cost-based rate entails sacrificing considerable margin from JPM while being exposed to opposition by the current customers of natural system reused water facing a significant upward adjustment in effluent prices.

3.11 Illustration of future cost-based tariff structure

In this part we present the long term tariff projection (years 2015 - 2030) of reclaimed water derived using the approach illustrated above.

The projections in Tables 3.3 and 3.4 are based on following growth projections and capital assets deployment

Table 3.3 Growth variables and values

Ordinary growth variables	Value	
Population	3.5% p.a.	60 m3/capita/year
AWC-served population (end 2012)	100,418	5.8 million m3/year
AWC-served population (end 2030)	185,000	11 million m3/year

Table 3.4 New development projects expected occupancy rate and treatment capacity

New development projects	Total capacity required	Cumulative occupancy & capacity required by 2020		Cumulative occupancy & capacity required by 2030	
	m^3/day	%	m^3/day	%	m^3/day
Ayla	12,750	50%	6,375	100%	12,750
Marsa zayed	15,050	20%	3,010	50%	7,525
Saraya	3,560	100%	3,560	100%	3,560
	31,360		**12,945**		**23,835**

Table 3.5 Incremental treatment capacity required over projection horizon (2015 - 2030)

	End	Increases				End
M^3/day	**2015**	**2017**	**2020**	**2025**	**2030**	**2030**
Natural	9,000	2,269				**11,269**
MEC-Ordinary	12,000	4,000	8,000	8,000		**32,000**
MEC-New Projects	--	12,945			10,890	**23,835**
Total end 2030 (m^3/day)						**67,104**

The results of the above projections are presented in Figures 3.1 and 3.2:

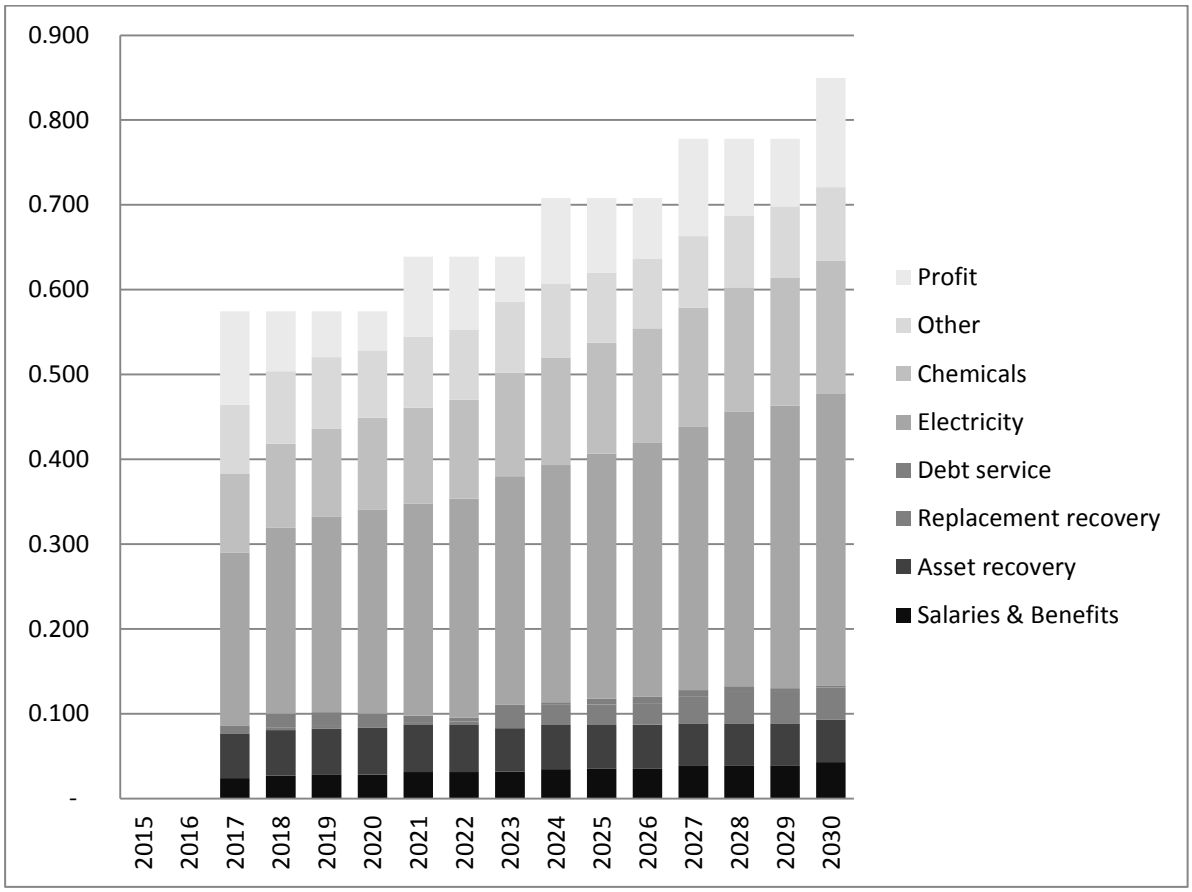

Figure 3-1 Natural Type A Price Breakdown JD/m^3 (assuming grants at 50%)

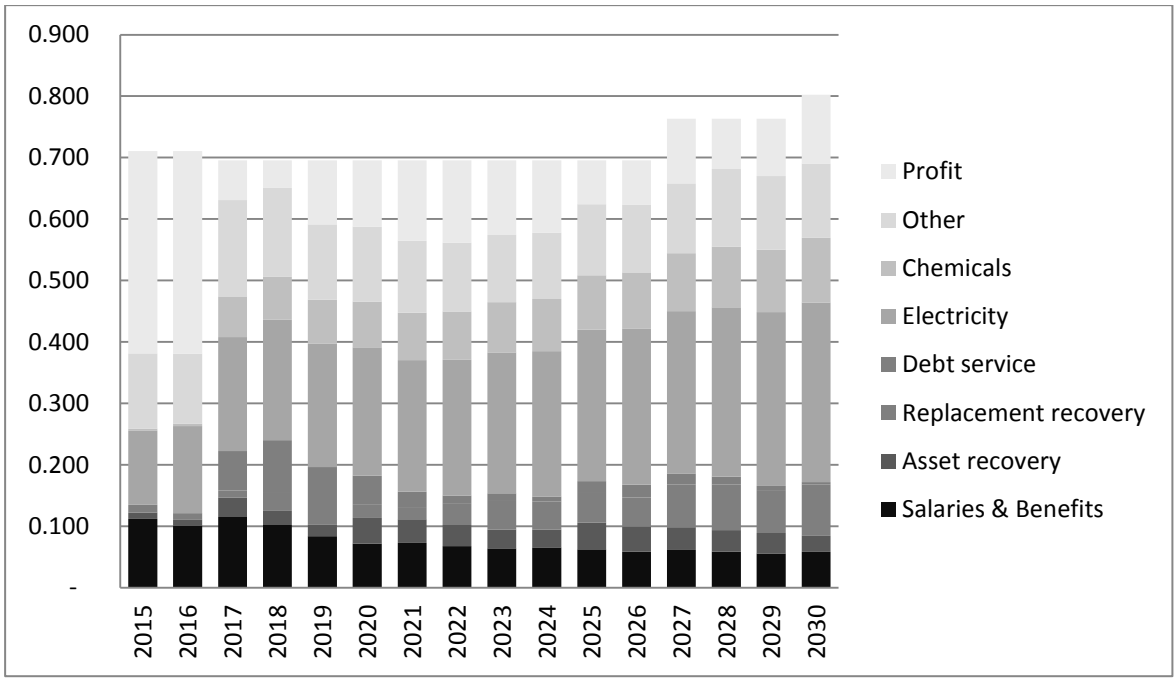

Figure 3-2 Mechanical Type A Price Breakdown JD/m^3 (assuming grants at 50%)

Given the importance of source of financing deployed in funding capital projects, projection of future tariffs is also forecasted under the following assumptions:

- Conservative scenario (grants at 0%)
- Optimistic scenario (grants at 85% - same grant level of 2004-2007 expansion)

The resulting projection is graphing Figures 3.3 and 3.4 along with base-case scenario of grants level at 50%.

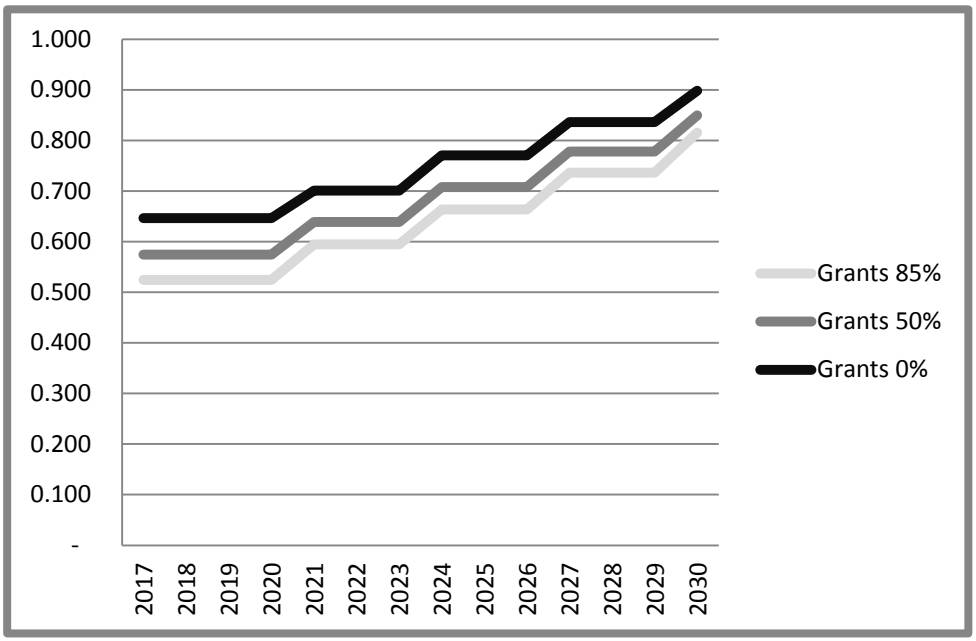

Figure 3-3 Natural Type A Price Projection

ATTACHMENT A

USAID WATER REUSE AND ENVIRONMENTAL CONSERVATION PROJECT
AQABA WWTP INTEGRATED WATER MANAGEMENT
REUSED WATER TARIFFING MODEL

1	Type A - Mechanical	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
	Salaries & Benefits	482,572	484,325	529,388	578,476	578,476	578,476	632,117	632,117	632,117	690,731	690,731	690,731	754,780	754,780	754,780	824,769
	Equipment maintenance	83,963	83,963	288,045	299,798	299,798	403,102	403,102	410,832	434,033	434,033	552,708	553,192	583,853	768,416	768,416	782,847
	Other repairs & maintenance	12,550	13,187	11,799	14,087	14,646	15,543	17,042	17,424	17,599	19,477	20,301	20,526	22,921	22,877	23,061	25,551
	Overheads	54,232	56,988	50,989	60,875	63,292	67,167	73,647	75,295	76,054	84,166	87,729	88,699	99,050	98,861	99,655	110,416
	Asset recovery	46,514	46,514	145,032	131,675	131,675	332,405	332,405	318,063	302,421	302,421	475,966	475,710	451,538	446,388	446,388	367,617
	Replacement recovery	52,837	52,837	52,837	171,674	171,674	171,674	171,674	320,491	475,537	475,537	550,866	553,459	853,481	945,689	945,689	1,182,161
	Debt service	-	-	295,497	480,580	470,812	379,971	217,824	126,983	107,447	87,911	198,867	244,029	220,526	164,094	88,470	51,574
	Electricity	519,344	681,201	850,962	1,107,163	1,379,529	1,668,910	1,854,479	2,051,643	2,261,054	2,483,412	2,719,454	2,969,960	3,235,760	3,517,735	3,816,795	4,133,930
	Chemicals	15,289	17,461	304,526	396,296	493,890	597,615	664,197	734,955	810,124	889,956	974,716	1,064,686	1,160,166	1,261,471	1,368,930	1,482,900
	Allocation of distribution cost	60,171	59,120	65,914	89,295	88,633	93,396	93,878	93,430	97,889	98,141	101,496	101,083	101,067	138,466	138,148	138,351
	Allocation of general overheads	317,179	335,302	301,804	356,185	372,545	397,726	431,091	443,382	450,540	492,872	516,819	525,666	580,273	582,639	590,843	647,125
	Rate requirements	1,644,649	1,830,898	2,896,794	3,686,104	4,064,971	4,705,985	4,891,456	5,224,614	5,664,814	6,058,657	6,889,655	7,287,742	8,063,415	8,701,417	9,041,175	9,747,239
	Allocate profit (loss) wastewater services (JD)	474,267	496,595	506,751	570,785	640,543	706,593	742,340	793,174	819,027	856,167	911,884	957,150	997,476	976,491	1,034,531	1,075,841
	Balance to cover by RW rate	1,170,383	1,334,303	2,390,043	3,115,319	3,424,428	3,999,393	4,149,116	4,431,440	4,845,787	5,202,490	5,977,771	6,330,592	7,065,939	7,724,926	8,006,644	8,671,398
	RW available for sale (m3)	3,068,177	3,504,000	3,789,244	4,787,524	5,792,751	6,805,164	7,343,057	7,888,664	8,442,223	9,004,023	9,574,351	10,153,495	10,741,789	11,339,569	11,947,122	12,564,833
	RW rate selected (JD/m3) Rate (3)	0.711	0.711	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.763	0.763	0.763	0.802
2	Rate breakdown (JD/m3)																
	Salaries & Benefits	0.112	0.101	0.115	0.102	0.084	0.072	0.073	0.068	0.064	0.066	0.063	0.059	0.062	0.059	0.056	0.058
	Equipment maintenance	0.019	0.017	0.063	0.053	0.044	0.050	0.047	0.044	0.044	0.041	0.050	0.047	0.048	0.060	0.057	0.055
	Other repairs & maintenance	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	Overheads	0.013	0.012	0.011	0.011	0.009	0.008	0.009	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.008
	Asset recovery	0.011	0.010	0.032	0.023	0.019	0.042	0.038	0.034	0.031	0.029	0.043	0.041	0.037	0.035	0.033	0.026
	Replacement recovery	0.012	0.011	0.012	0.030	0.025	0.021	0.020	0.034	0.048	0.045	0.050	0.047	0.070	0.074	0.070	0.084
	Debt service	-	-	0.064	0.085	0.068	0.047	0.025	0.014	0.011	0.008	0.018	0.021	0.018	0.013	0.007	0.004
	Electricity	0.120	0.142	0.185	0.195	0.201	0.208	0.214	0.221	0.229	0.237	0.246	0.254	0.264	0.275	0.283	0.293
	Chemicals	0.004	0.004	0.066	0.070	0.072	0.075	0.077	0.079	0.082	0.085	0.088	0.091	0.095	0.099	0.101	0.105
	Distribution	0.014	0.012	0.014	0.016	0.013	0.012	0.011	0.010	0.010	0.009	0.009	0.009	0.008	0.011	0.010	0.010
	General overheads	0.074	0.070	0.066	0.063	0.054	0.050	0.050	0.048	0.046	0.047	0.047	0.045	0.047	0.046	0.044	0.046
	Profit	0.329	0.330	0.065	0.045	0.104	0.108	0.131	0.134	0.122	0.118	0.071	0.072	0.105	0.082	0.093	0.112
	Rate (JD/m3)	0.711	0.711	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.696	0.763	0.763	0.763	0.802
	Rate breakdown (%)																
	Salaries & Benefits	16%	14%	17%	15%	12%	10%	10%	10%	9%	9%	9%	8%	8%	8%	7%	7%
	Equipment maintenance	3%	2%	9%	8%	6%	7%	7%	6%	6%	6%	7%	7%	6%	8%	7%	7%
	Other repairs & maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Overheads	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
	Asset recovery	2%	1%	5%	3%	3%	6%	6%	5%	4%	4%	6%	6%	5%	5%	4%	3%
	Replacement recovery	2%	2%	2%	4%	4%	3%	3%	5%	7%	7%	7%	7%	9%	10%	9%	10%
	Debt service	0%	0%	9%	12%	10%	7%	4%	2%	2%	1%	3%	3%	2%	2%	1%	0%
	Electricity	17%	20%	27%	28%	29%	30%	31%	32%	33%	34%	35%	37%	35%	36%	37%	36%
	Chemicals	0%	1%	10%	10%	10%	11%	11%	11%	12%	12%	13%	13%	12%	13%	13%	13%
	Distribution	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
	General overheads	10%	10%	9%	9%	8%	7%	7%	7%	7%	7%	7%	6%	6%	6%	6%	6%
	Profit	46%	46%	9%	6%	15%	16%	19%	19%	17%	17%	10%	10%	14%	11%	12%	14%
	Rate (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

USAID WATER REUSE AND ENVIRONMENTAL CONSERVATION PROJECT
AQABA WWTP INTEGRATED WATER MANAGEMENT
REUSED WATER TARIFFING MODEL

Type A - Natural	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Salaries & Benefits	-	-	100,629	109,960	109,960	109,960	120,157	120,157	120,157	131,298	131,298	131,298	143,473	143,473	143,473	156,777
Equipment maintenance	-	-	68,184	68,678	68,678	68,678	68,678	68,714	73,079	73,079	73,079	73,165	74,037	75,812	75,812	75,812
Other repairs & maintenance	-	-	8,010	7,812	7,446	6,845	7,369	7,129	6,936	7,380	6,895	6,727	7,016	6,652	6,551	6,913
Overheads	-	-	34,615	33,757	32,176	29,579	31,845	30,806	29,975	31,893	29,794	29,071	30,319	28,745	28,308	29,872
Asset recovery	-	-	218,394	214,742	214,742	214,742	214,742	213,800	195,345	195,345	195,345	195,070	185,801	181,463	181,463	181,463
Replacement recovery	-	-	1,037	14,032	14,032	14,032	14,032	16,339	89,531	89,531	89,531	90,697	116,480	139,288	139,288	139,288
Debt service	-	-	39,564	64,345	63,037	50,875	29,165	17,002	14,386	11,770	26,626	32,673	29,526	21,971	11,845	6,905
Electricity	-	-	858,454	884,016	910,344	937,462	965,394	994,163	1,023,796	1,054,318	1,085,755	1,118,135	1,151,487	1,185,840	1,221,223	1,257,667
Chemicals	-	-	388,016	399,656	411,646	423,995	436,715	449,817	463,311	477,211	491,527	506,273	521,461	537,105	553,218	569,814
Allocation of distribution cost	-	-	25,662	34,765	34,507	28,488	28,635	28,498	29,858	29,935	25,448	25,344	25,340	27,946	27,882	27,923
Allocation of general overheads	-	-	204,884	197,512	189,391	175,153	186,406	181,402	177,571	186,761	175,520	172,285	177,617	169,408	167,837	175,073
Rate requirements	-	-	1,947,449	2,029,275	2,055,958	2,059,809	2,103,138	2,127,825	2,223,946	2,288,522	2,330,819	2,380,739	2,462,558	2,517,703	2,556,901	2,627,508
Allocate profit (loss) wastewater services (JD)	-	-	435,657	388,387	360,219	338,247	329,329	327,543	316,042	309,760	310,266	307,091	302,503	280,527	282,087	278,930
Balance to cover by RW rate	-	-	1,511,791	1,640,887	1,695,739	1,721,562	1,773,809	1,800,282	1,907,904	1,978,762	2,020,554	2,073,647	2,160,055	2,237,176	2,274,813	2,348,578
RW available for sale (m3)	-	-	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643	3,257,643
RW rate selected (JD/m3) Rate (3)	-	-	0.574	0.574	0.574	0.574	0.639	0.639	0.639	0.708	0.708	0.708	0.778	0.778	0.778	0.850
Rate breakdown (JD/m3)																
Salaries & Benefits	-	-	0.024	0.027	0.028	0.028	0.031	0.031	0.032	0.035	0.035	0.035	0.039	0.039	0.039	0.043
Equipment maintenance	-	-	0.016	0.017	0.017	0.018	0.018	0.018	0.019	0.019	0.019	0.020	0.020	0.021	0.021	0.021
Other repairs & maintenance	-	-	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Overheads	-	-	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
Asset recovery	-	-	0.052	0.053	0.054	0.055	0.056	0.056	0.051	0.052	0.052	0.052	0.050	0.049	0.050	0.050
Replacement recovery	-	-	0.000	0.003	0.004	0.004	0.004	0.004	0.024	0.024	0.024	0.024	0.031	0.038	0.038	0.038
Debt service	-	-	0.009	0.016	0.016	0.013	0.008	0.004	0.004	0.003	0.007	0.009	0.008	0.006	0.003	0.002
Electricity	-	-	0.205	0.219	0.230	0.241	0.250	0.258	0.270	0.280	0.289	0.299	0.310	0.323	0.334	0.345
Chemicals	-	-	0.092	0.099	0.104	0.109	0.113	0.117	0.122	0.127	0.131	0.135	0.140	0.147	0.151	0.156
Distribution	-	-	0.006	0.009	0.009	0.007	0.007	0.007	0.008	0.008	0.007	0.007	0.007	0.008	0.008	0.008
General overheads	-	-	0.049	0.049	0.048	0.045	0.048	0.047	0.047	0.050	0.047	0.046	0.048	0.046	0.046	0.048
Profit	-	-	0.110	0.071	0.054	0.046	0.095	0.086	0.053	0.100	0.088	0.071	0.115	0.091	0.079	0.129
Rate (JD/m3)	-	-	0.574	0.574	0.574	0.574	0.639	0.639	0.639	0.708	0.708	0.708	0.778	0.778	0.778	0.850
Rate breakdown (%)																
Salaries & Benefits	0%	0%	4%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Equipment maintenance	0%	0%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	2%
Other repairs & maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Overheads	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Asset recovery	0%	0%	9%	9%	9%	10%	9%	9%	8%	7%	7%	7%	6%	6%	6%	6%
Replacement recovery	0%	0%	0%	1%	1%	1%	1%	1%	4%	3%	3%	3%	4%	5%	5%	4%
Debt service	0%	0%	2%	3%	3%	2%	1%	1%	1%	0%	1%	1%	1%	1%	0%	0%
Electricity	0%	0%	36%	38%	40%	42%	39%	40%	42%	40%	41%	42%	40%	42%	43%	41%
Chemicals	0%	0%	16%	17%	18%	19%	18%	18%	19%	18%	18%	19%	18%	19%	19%	18%
Distribution	0%	0%	1%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
General overheads	0%	0%	9%	9%	8%	8%	8%	7%	7%	7%	7%	7%	6%	6%	6%	6%
Profit	0%	0%	19%	12%	9%	8%	15%	14%	8%	14%	12%	10%	15%	12%	10%	15%
Rate (%)	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

ATTACHMENT B

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USAID Water Reuse and Environmental Conservation Project

Aqaba Integrated Water Resource Management *Water Reuse Financial Planning Assistance*

Presentation to
Aqaba Water Company

10 June 2015
Implemented by AECOM

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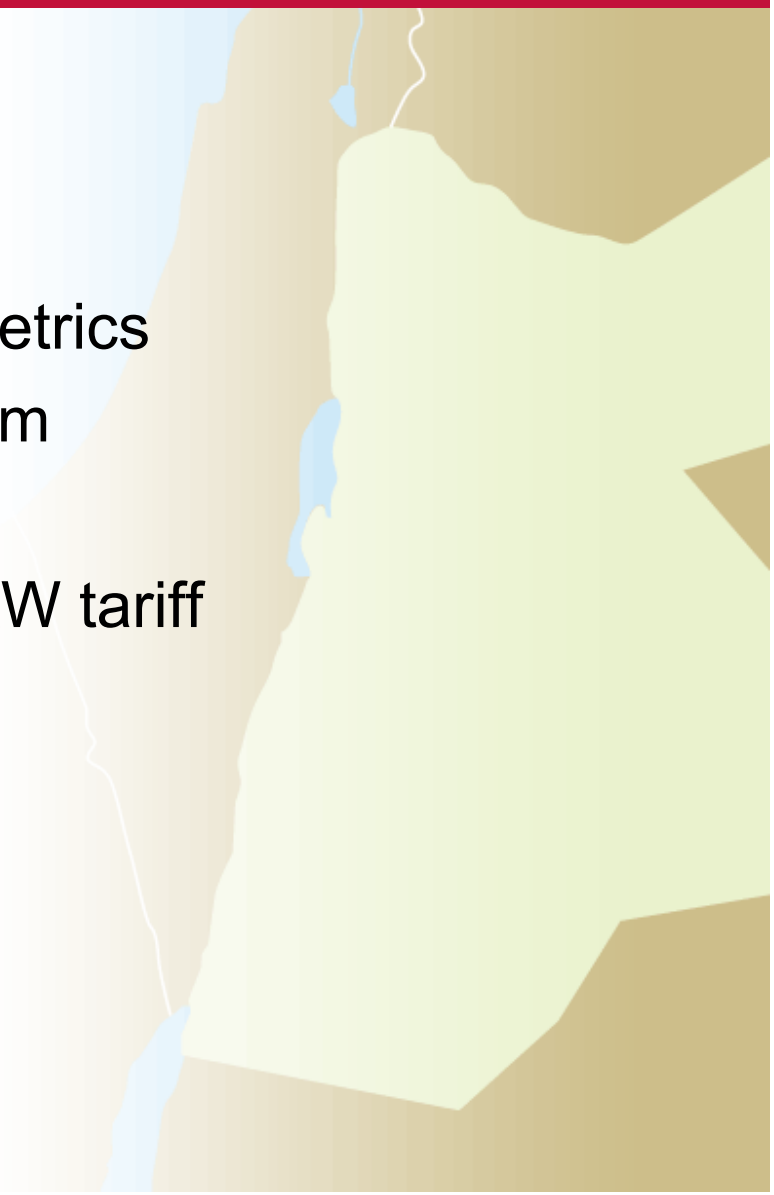
AGENDA

- Project objectives
- Natural TP upgrade feasibility metrics
- RW rate development mechanism
- Other operating costs
- 2014 negotiated vs. pro forma RW tariff



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OBJECTIVES

- Natural TP upgrade preferred option
  - Net Present Value
  - Internal Rate of Return
  - Simple Payback Period
- RW tariffing model
  - Current Natural system—to be discontinued end 2016
  - Upgraded Natural system—Type A only
  - Mechanical system—Type A
- New development projects CAPEX participation
  - Ayla (12,750 m^3/day)
  - Marsa Zaid (15,050 m^3/day)
  - Saraya (3,560 m^3/day)

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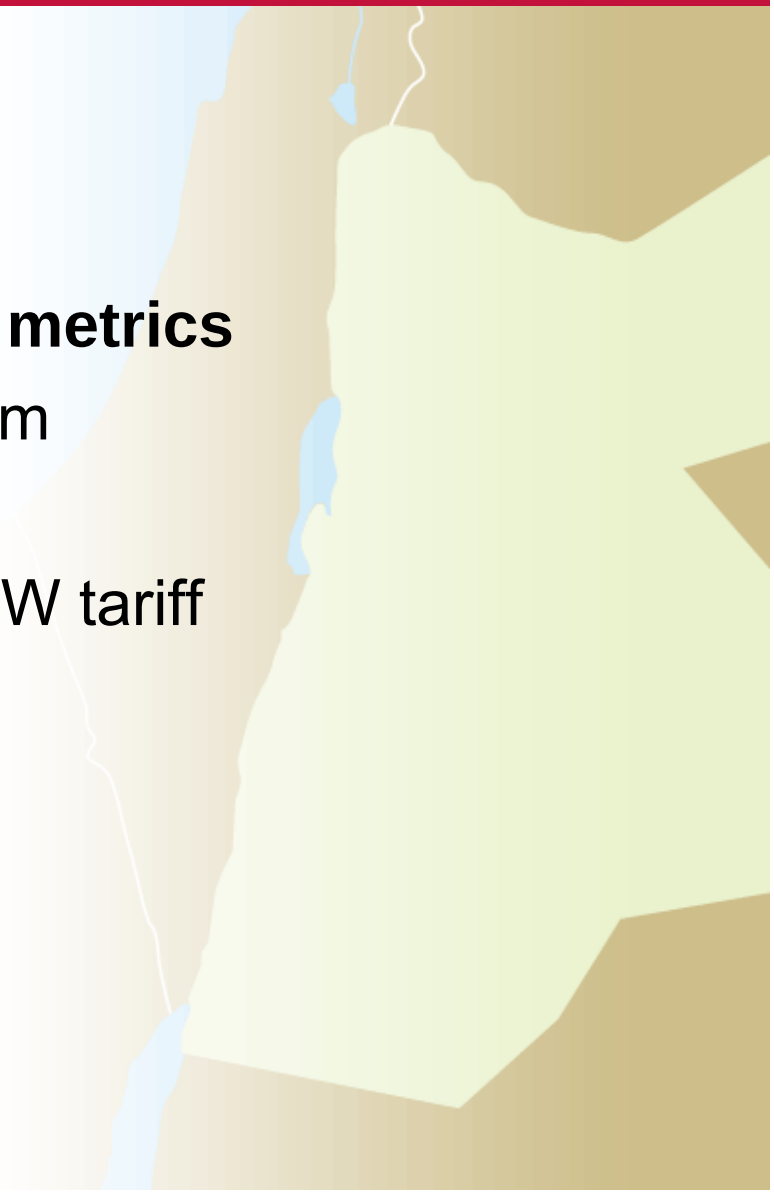
AGENDA

- Project objectives
- **Natural TP upgrade feasibility metrics**
- RW rate development mechanism
- Other costs
- 2014 negotiated vs. pro forma RW tariff



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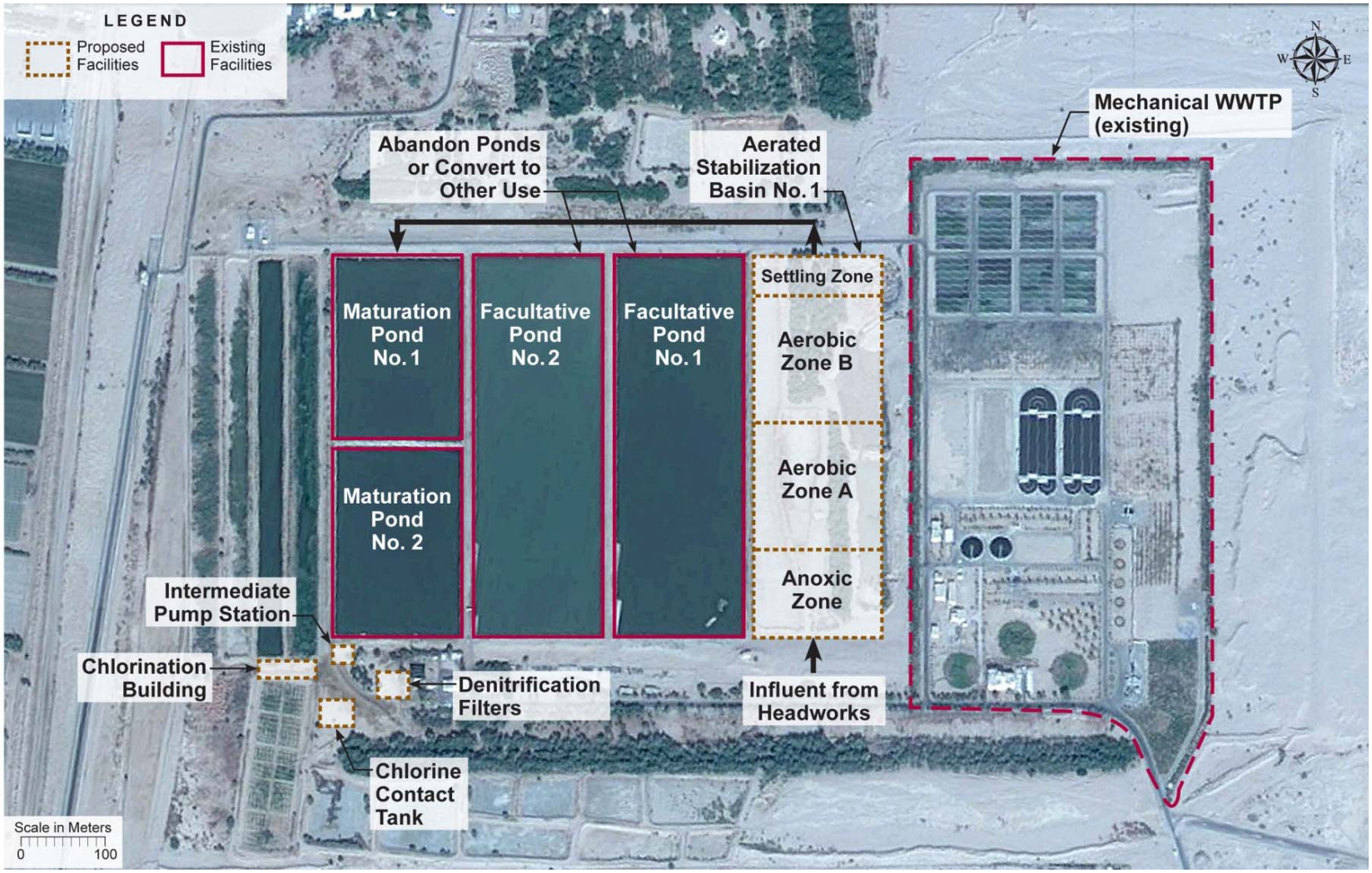
NATURAL PLANT UPGRADE – NEW AERATED STABILIZATION BASIN



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NATURAL TP UPGRADE FEASIBILITY
NEW AERATED STABILIZATION BASIN

Discount Rate	4.68%	
Equity NPV (million JOD)	2.4	
Equity IRR	11%	
Simple Payback Period	148 months	12.3 years

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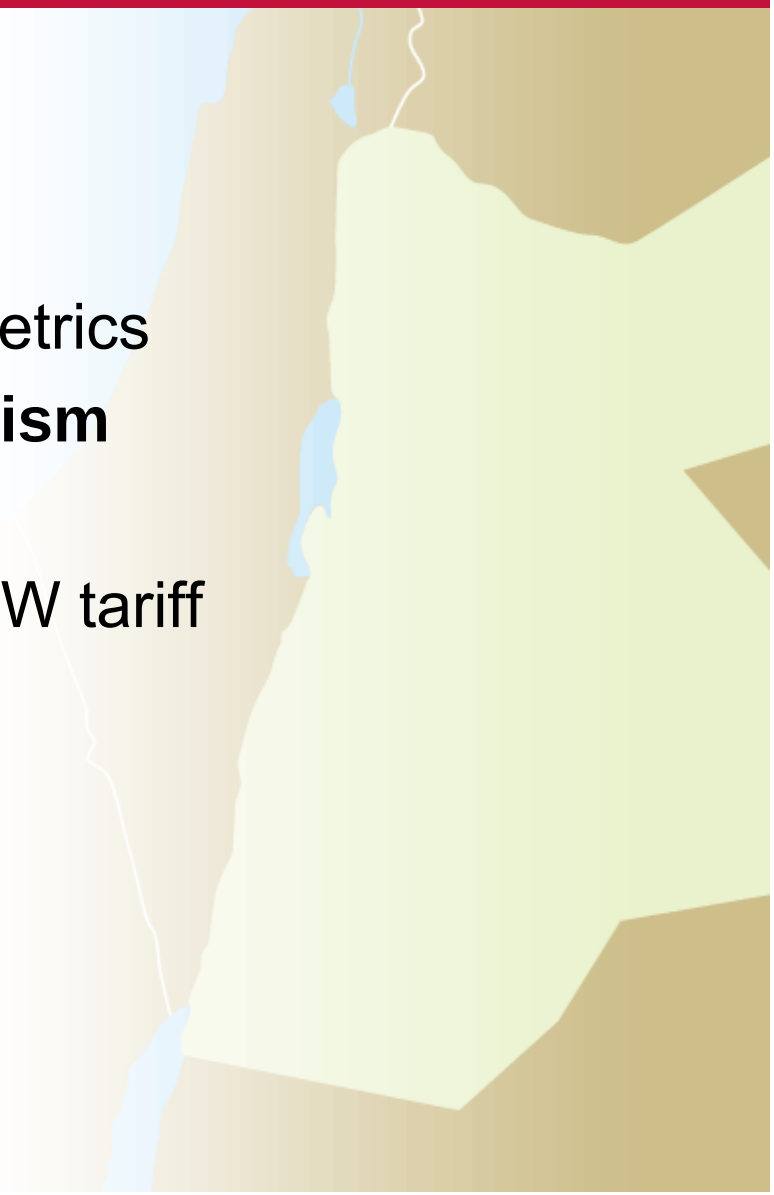
AGENDA

- Project objectives
- Natural TP upgrade feasibility metrics
- **RW rate development mechanism**
- Other costs
- 2014 negotiated vs. pro forma RW tariff



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LONG TERM PROJECTIONS

- Projection horizon till 2030
- Growth drivers
  - Aqaba population growth – 3.5% p.a.
  - New development projects

	Cumulative 2020	Cumulative 2030
Ayla	50%	100%
Marsa Zayed	20%	50%
Saraya	100%	100%

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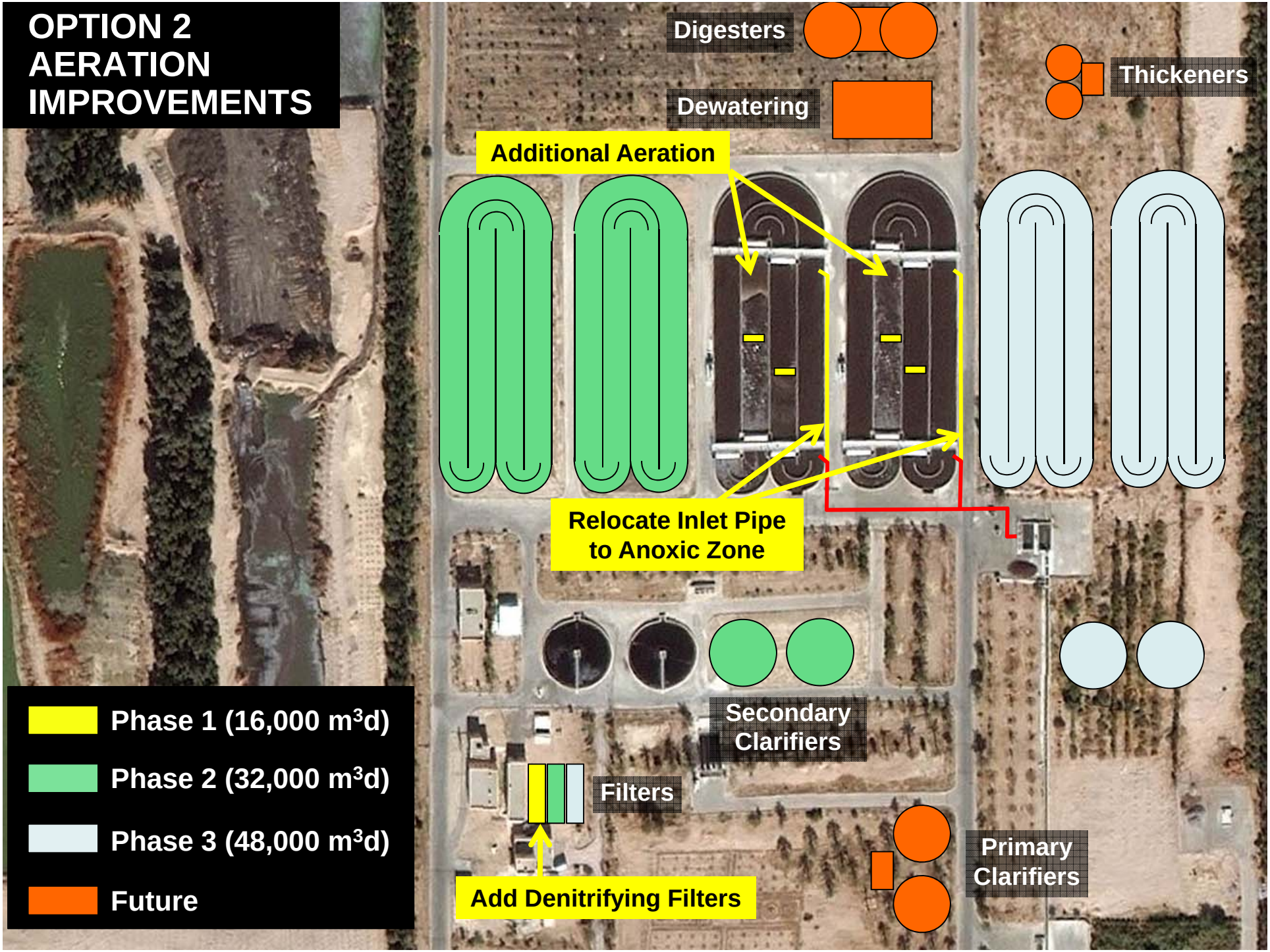
FORECAST CAPEX REQUIREMENTS

- Upgrade existing mechanical plant by implementing aeration improvements:
  - Increase capacity by 4,000 m^3/day (refer to slide 8)
- Replacement of assets
  - Average useful life, weighted by individual component cost, comes to 32 years
- Escalation rate of 2.35% p.a. applied to future expansion and asset replacements

	End	Increases				End
M^3/day	2015	2017	2020	2025	2030	2030
Natural	9,000	2,269				11,269
MEC-Ordinary	12,000	4,000	8,000	8,000		32,000
MEC-New Projects	--	12,945			10,890	23,835
Total end 2030 (m3/day)						**67,104**


OPTION 2
AERATION
IMPROVEMENTS
Digesters
Thickeners
Dewatering
Additional Aeration
Relocate Inlet Pipe
to Anoxic Zone
Secondary
Clarifiers
Filters
Add Denitrifying Filters
Primary
Clarifiers
Phase 1 (16,000 m³d)
Phase 2 (32,000 m³d)
Phase 3 (48,000 m³d)
Future

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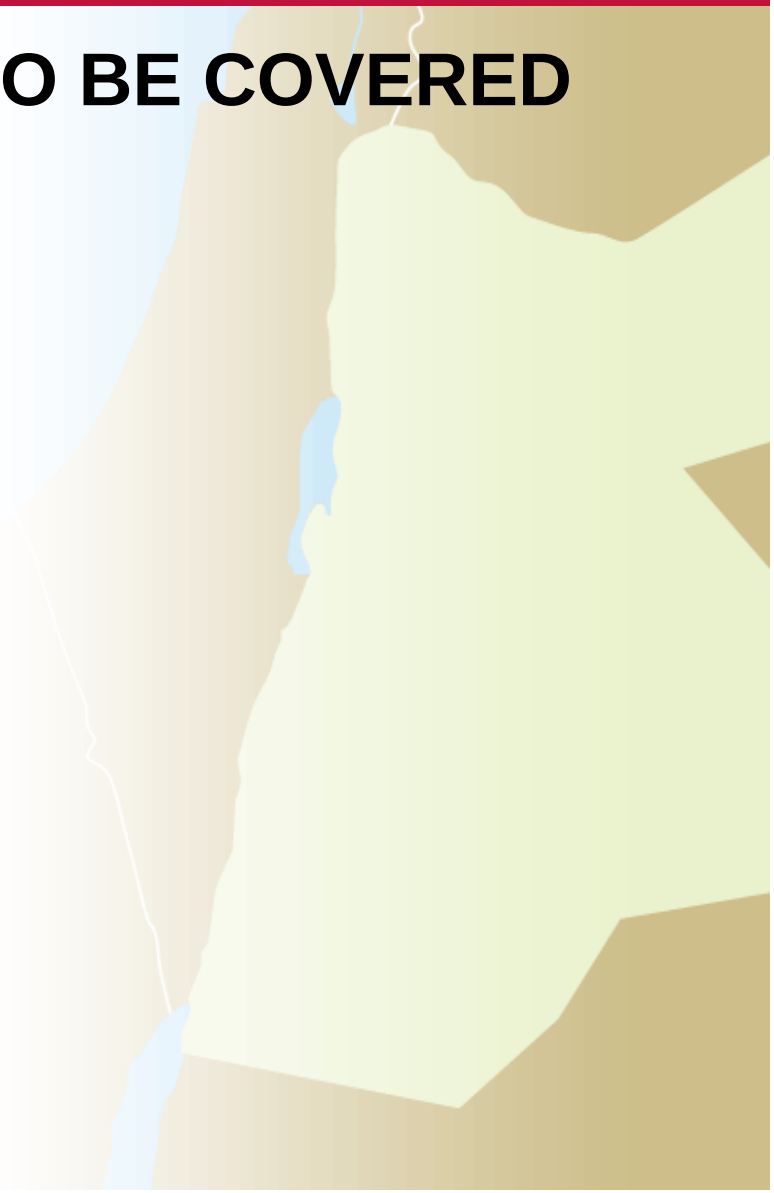
IDENTIFY COST DRIVERS TO BE COVERED THROUGH THE RATE

- Salaries and benefits
- Maintenance
- Electricity
- Chemicals
- Overheads



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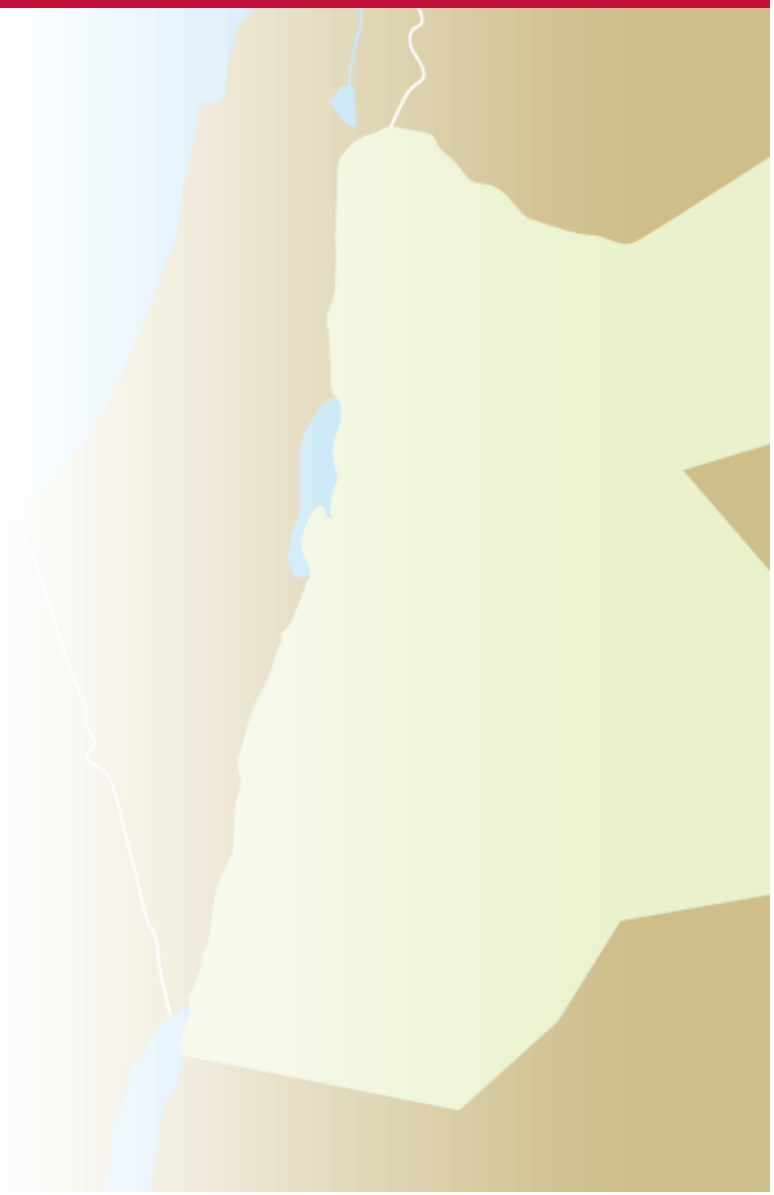
FINANCING OPTIONS

- Internal sources
  - Connection fees
  - Sewerage taxes
  - Wastewater fees
- External sources
  - Grants
  - Commercial funding



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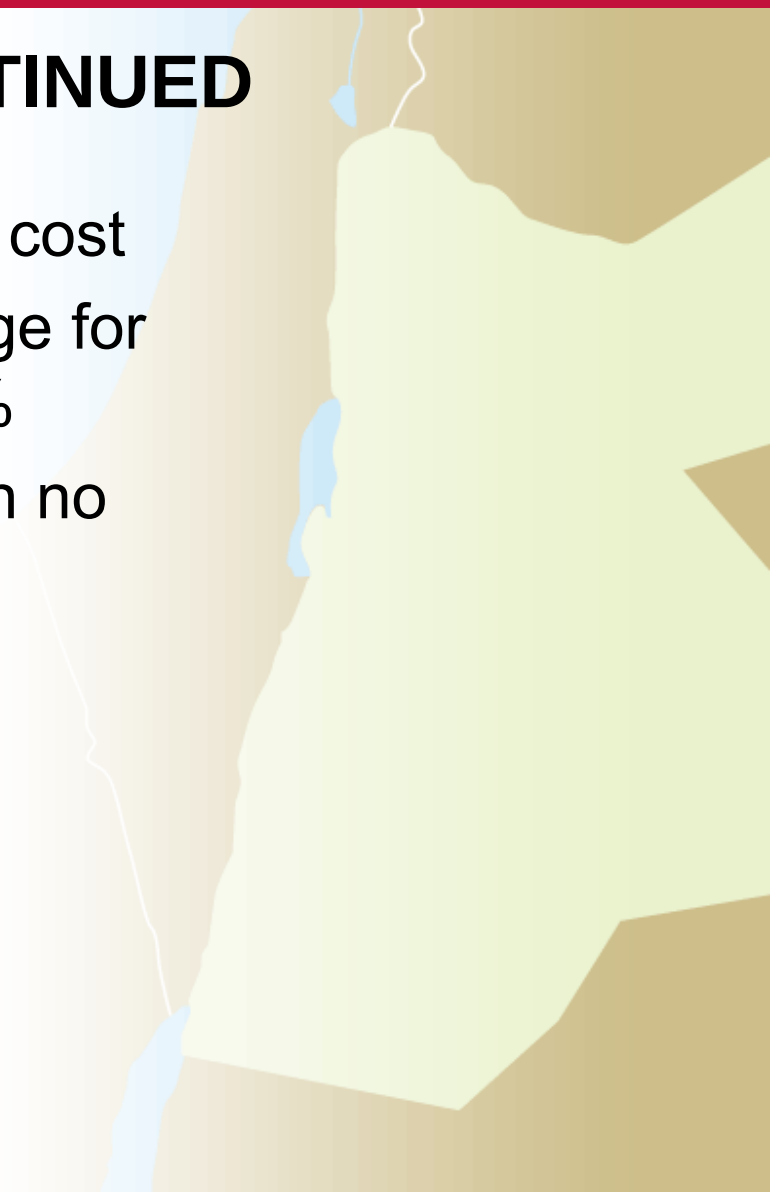
PROJECT RW RATE…CONTINUED

- Cost markup added to allocated cost
- Cost markup set as AWC average for the period 2010 – 2013 of 13.9%
- Rate resetting every 3 years with no rate decrease.



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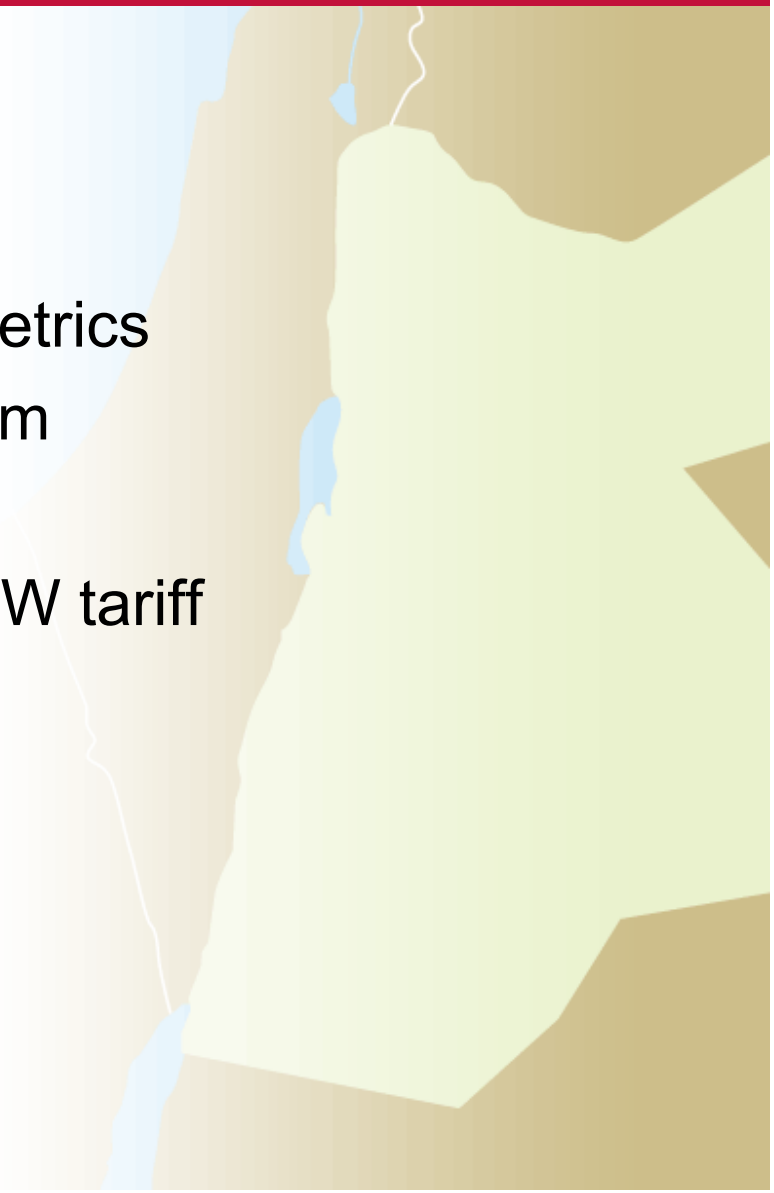
AGENDA

- Project objectives
- Natural TP upgrade feasibility metrics
- RW rate development mechanism
- **Other costs**
- 2014 negotiated vs. pro forma RW tariff



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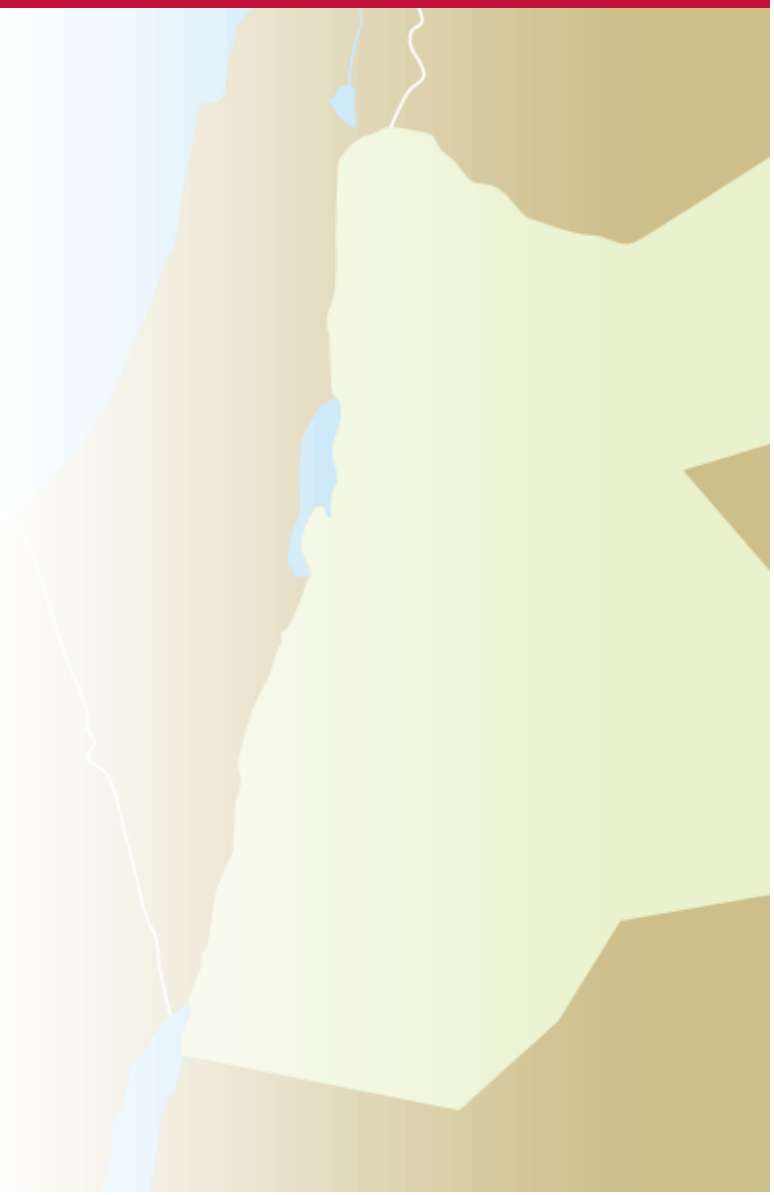
SALARIES & BENEFITS

- Includes long term projections of work loads by employee and cost center
- Cost comprised of
  - Basic salary
  - Recurring benefits, bonuses, allowances…



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MAINTENANCE

- Annual maintenance is estimated as % of CAPEX as follows
  - Mechanical equipment 2.5%
  - Electrical equipment 2.0%
  - Civil works 0.1%
- Projected annual maintenance at rates below JOD 170k for 2014 vs. actual maintenance of JOD 20k
- Maintenance reserve to be created for future refurbishment and repair works

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ELECTRICITY

- Using electricity consumption data of prior periods, an allocation basis is developed
- Future electricity price increases estimated

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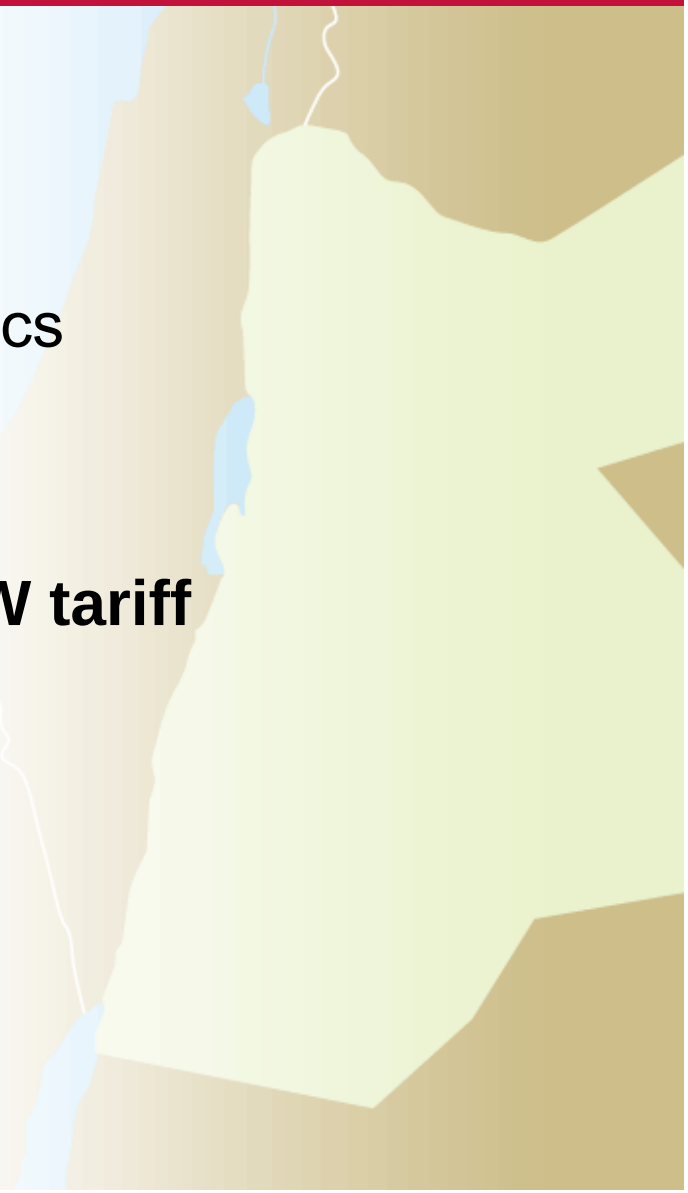
AGENDA

- Project objectives
- Natural TP upgrade feasibility metrics
- RW rate development mechanism
- Other costs
- **2014 negotiated vs. pro forma RW tariff**



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2014 NEGOTIATED VS. PRO FORMA RATE

Fils/m^3	Natural existing	Natural Proforma	Mechanical existing	Mechanical proforma
Selling price	103	271	711	612
Cost	(238)	(238)	(538)	(538)
Profit (loss)	**(135)**	**33**	**173**	**74**
Profit (loss) % of cost	(56.7%)	13.9%	32.2%	13.9%

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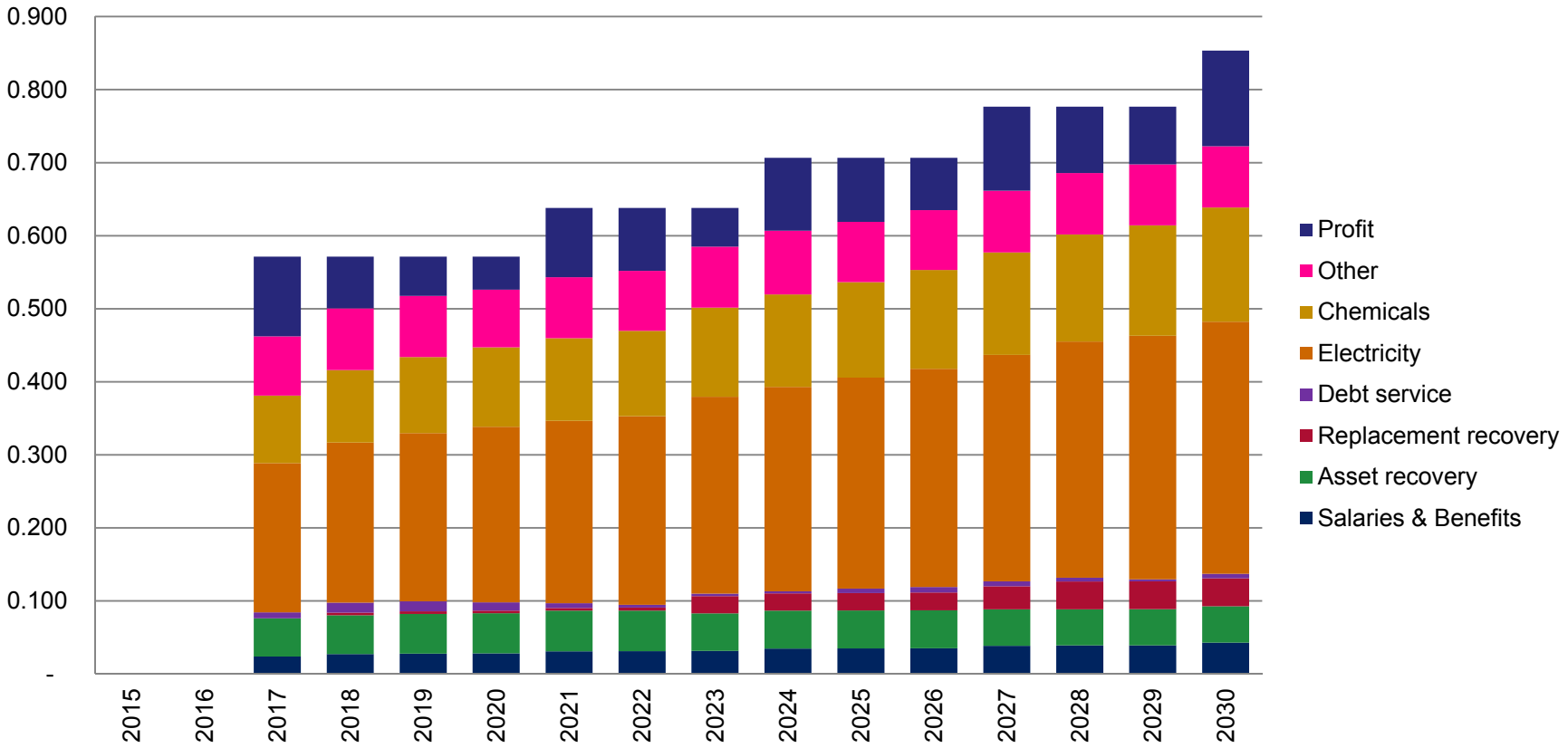
PROJECTED NATURAL TARIFF (GRANTS AT 50%)



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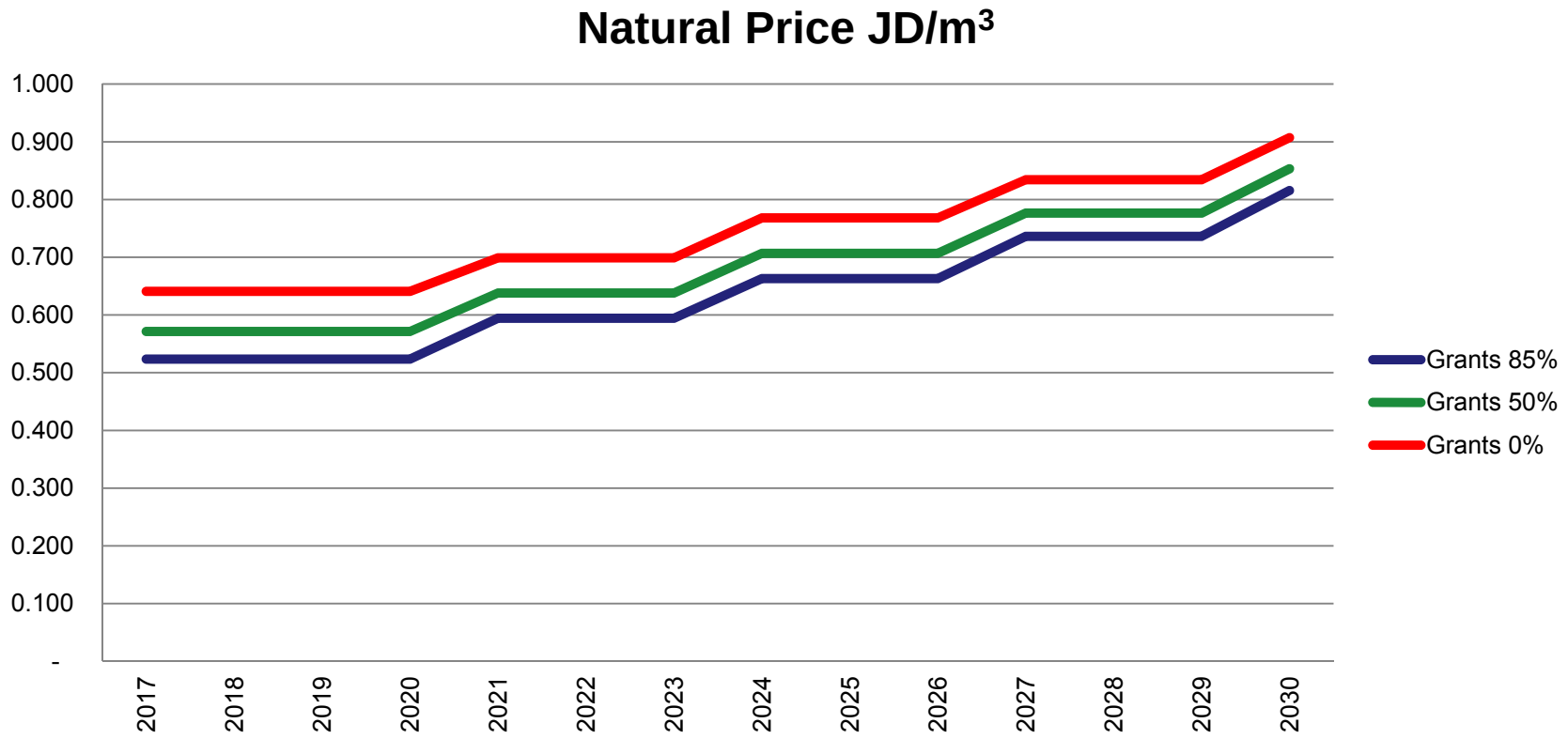
PROJECTED NATURAL TARIFF

(DIFFERENT FUNDING ASSUMPTIONS)



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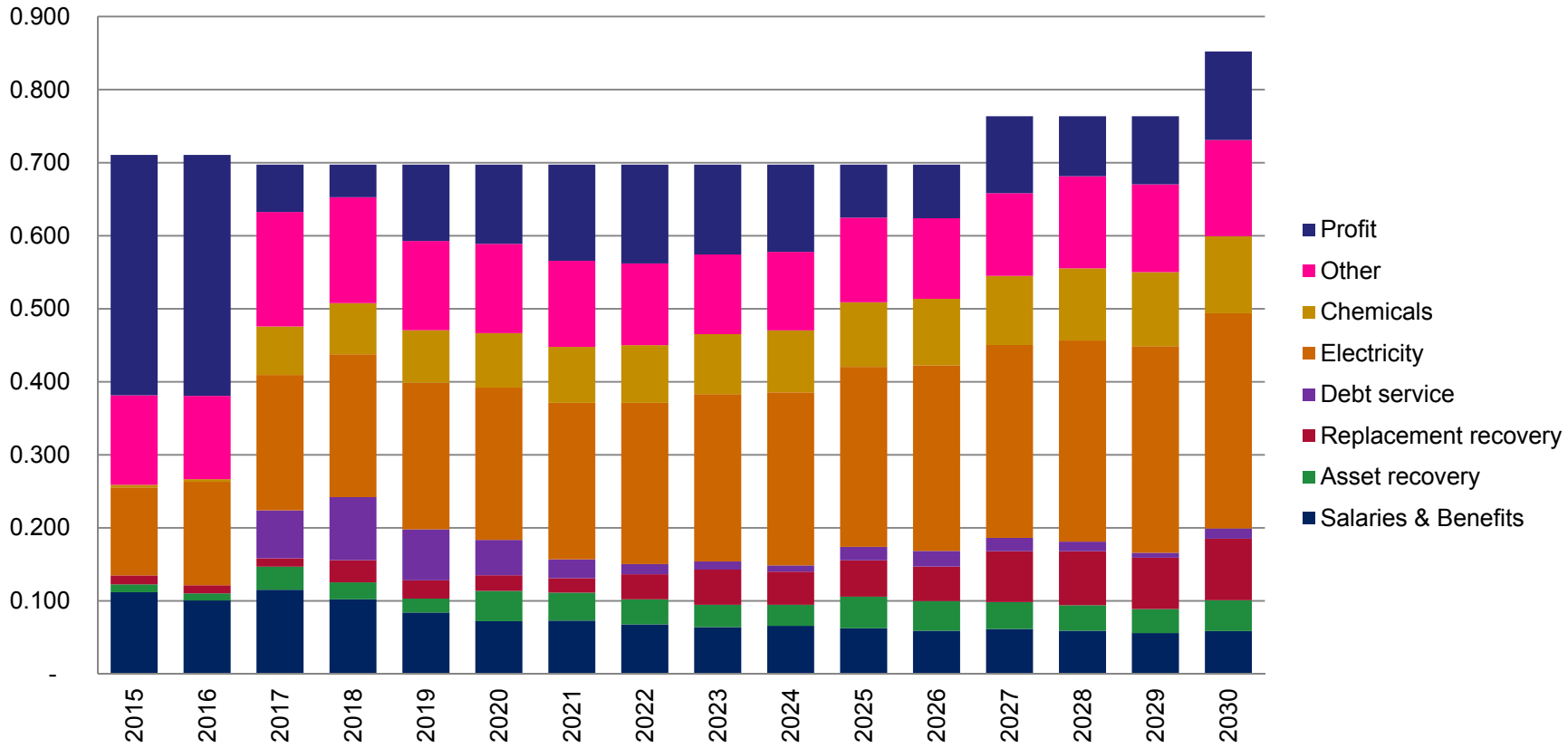
PROJECTED MECHANICAL TARIFF

(GRANTS AT 50%)



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PROJECTED MECHANICAL TARIFF

(DIFFERENT FUNDING ASSUMPTIONS)