

Financial feasibility of water efficiency measures

Exercise

Thursday, 15 June 2023



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Background and rationale

Considering financial feasibility when implementing water use optimization measures for industries is critical to ensure that these measures are sustainable, compliant with regulations, and can generate a positive return on investment. Water use optimization measures can help industries become more sustainable in the long term by reducing water consumption, reducing costs associated with water usage and reducing environmental impact. However, if the investment and operating costs of implementing these measures are too high, it may not be possible to maintain them over time, and the industry may revert to its previous water use practices. Most industries are subject to water-related regulations and standards, and failure to comply with these regulations can result in fines, penalties, and legal action. By considering financial feasibility in water use optimization measures, industries can ensure that they are in compliance with these regulations while also meeting their financial goals.

Learning objectives

By the end of this exercise, you will be able to evaluate and compare the cost-effectiveness and profitability of different water use optimisation measures using a simple EXCEL-based finance calculation tool.

Learning methodology

The exercise is based upon a fictitious Jordanian business case, two (2) unspecified technical solutions for tertiary wastewater treatment and two (2) real existing credit options for companies.

Case study background

Like many other Jordanian companies, the privately-owned company in our example is also affected by water problems. In recent years, the water level in the company's own wells has dropped considerably. This has led to the company having to buy about 500 m³/day of water from other sources at a price of more than two Jordanian dinars per cubic metre (2.00 JOD/m³) - eight times the cost of water from its own well. In this case, there is a very large potential for water and cost savings if treated wastewater is (re)used instead of purchased water. However, the company's own wastewater treatment plant is undersized due to the sharp increase in production since the company was founded 10 years ago and does not reach acceptable quality standards for reuse. By adding a tertiary treatment component to the existing treatment plant, the company should be able to recover up to 150,000 m³/year of treated wastewater for reuse in its plant (e.g. for boilers, cooling, domestic purposes, etc.) worth 300,000 JOD/year (at 2.00 JOD/m³ of avoided expenses on previously needed trucked water supply).

Possible loans

For this exercise, two (2) optional loan facilities have been identified:

Central Bank of Jordan Instrument

The Central Bank of Jordan's (CBJ) non-sectoral credit facility specifically targets manufacturing companies with loan amounts of up to JOD 4 million (in total for various projects) for assets (equipment, land, etc.). Companies can apply through any Jordanian bank. Based on due diligence of the company and careful review of the application documents - which must include information on the nature of the business, the proposed water efficiency measure (WEM), the benefits of the WEM to the company, the project components, the project implementers (service providers), the contract between the company and the service provider/supplier, certificates, company registration, financial audits for three years, feasibility study of the WEM project, payback period calculation, CREF for company owner and central bank, etc., the bank makes a risk assessment and decides on the interest rate (IR) and the amount of collateral.

Maximum loan size:	4,000,000 JOD
Maximum loan period:	120 months (10 years)
Maximum grace period:	24 months
Annual interest rate:	4.0 - 4.5% ¹
Cashback:	not applicable
Cashback payment year:	not applicable
Matching funds:	not required; optional self- or co-funding requires guarantee

European Bank for Reconstruction and Development Instrument

The European Bank for Reconstruction and Development (EBRD) credit facility is specifically for green sector companies and managed by Etihad Bank, Cairo Amman Bank and Microfund for Women.

¹ Depending on risk assessment

Maximum loan size: 780,000 JOD (1 million EUR)
 Maximum loan period: 60 months (5 years)
 Maximum grace period: 12 months
 Annual interest rate: ca. 9.5%
 Cashback: 10 - 15%²
 Cashback payment year: upon successful implementation of project
 Matching funds: not required

Exercise description

In this exercise, we assume that the capital cost (CAPEX) of Technology A is JOD 425,000. In the first two years, the operating costs (OPEX) amount to 10% of the investment costs. In the following years, the operating costs increase by 1% every 2 years.

The CAPEX of Technology B is JOD 300,000. In the first two years, the OPEX amount to 20% of the investment costs. In the following years, the operating costs increase by 1% every 2 years.

Year	Type of Cashflow	Technology A	Technology B
0	CAPEX	-425,000	-300,000
1	OPEX	-43.563	-61.500
2	OPEX	-44.652	-63.038
3	OPEX	-50.345	-67.844
4	OPEX	-51.603	-69.540
5	OPEX	-57.702	-74.673
6	OPEX	-59.144	-76.540
7	OPEX	-65.675	-82.019
8	OPEX	-67.317	-84.070
9	OPEX	-74.307	-89.918
10	OPEX	-76.165	-92.166

For the loan repayment calculations for the Central Bank of Jordan loans (i.e. CBJ-350K, CBJ-225K), a shortened loan term and grace period of 60 months and 18 months respectively are assumed, and the interest rate is set at 4.5%.

The assumptions for the calculation of the loan repayment for the European Bank for Reconstruction and Development loans (i.e. EBRD-350K, EBRD-225K) are a loan term of 60 months, a grace period of 12 months, an interest rate of 9.5%, and a cashback payment of 15%³ of CAPEX at the end of the 1st loan year (upon completion and commissioning of the tertiary treatment plant).

² Determined by EBRD technical team and ranging from 10% (for climate mitigation measures) to 15% (for adaptation measures)

³ Assuming that WEM is considered an adaptation measure

Other considerations in the selection process

Solution A combines two proven treatment processes in a sequential manner for advanced tertiary wastewater treatment. The treated (waste)water can meet stringent regulatory requirements and be suitable for a range of beneficial uses, including industrial applications, landscape irrigation, and groundwater recharge. However, the combination of the processes is a relatively new operating model for companies and is not yet widely available and used in the Jordanian market. While regular cleaning, maintenance and adherence to operational best practices are required to maintain treatment efficiency, one of the components is known for its longevity and durability, therefore reducing frequency of replacement and maintenance costs. This technology is also compact, has a small footprint and in general requires less space compared to Technology B. It can be easily integrated into existing treatment systems or retrofitted into smaller treatment plants.

Solution B also combines two proven tertiary wastewater treatment processes providing excellent treatment efficiency by effectively removing suspended solids, fine particles, and pathogens. This versatility makes them suitable for various wastewater treatment applications. The technology is relatively simple to operate and maintain, but generally requires more space compared to Solution A and uses more resources.

Assumptions and simplifications

- Implementation is completed in year 0 and all CAPEX are incurred in the same year
- Revenues/savings from the WEM are only generated from year 1 onwards
- Negative values indicate costs/investments, positive values inflows/revenues
- OPEX increase 1% every 2 years
- The long-term average inflation rate is estimated to amount to 2.50% per year
- A time span of up to 10 years is considered
- The company's specific Weighted Average Cost of Capital (WACC) or Depreciation Rate (DR) is assumed to be 10%

Exercise tasks

Discuss the financial feasibility of the two WEMs. What combination of technology and credit is most likely to offset the initial investment?

Task 1: Compare the Simple Payback Periods (SPP) for the 4 different combinations of Solutions A & B and financial instruments (CBJ & EBRD) on sheet "Financing Comparison".

- If you only look at the results of the Simple Payback Period (SSP) calculation, are these results meaningful enough to make an informed recommendation for one or the other combination of technical solution and financial instruments on this basis?
- What are the pros and cons of the Simple Payback Period calculation?

- Task 2:** What other financial metrics or indicators do you know that account for the time value of money and the risk-adjusted cost of capital?
- Task 3:** **Compare the NPV, IRR and PI values** for the 4 different combinations of Solutions A & B and financial instruments (CBJ & EBRD) on sheet “Financing Comparison”.
- Are you able to make an informed recommendation for one or the other combination of technical solution and financial instrument based on a comparison of Net Present Values (NPVs), the Internal Rates of Return (IRRs) and the Profitability Indexes (PIs)?
- Task 4:** If a clear recommendation (after comparing PPs, NPVs, IRRs and PIs) should still not be possible, what other factors can influence the investment decision?