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Sustainable Water Integrated Management

Promote wastewater treatment and reuse in the water scarce areas of the Middle East and North Africa

The Applied Research Institute – Jerusalem Society (ARIJ)

July 2018

Overview

- Project Location: Wadi Al-Aroub, Palestine
  Start Date: 2017
- End Date: 2019

The main objective (MO) of the project is

to promote wastewater treatment and reuse in the water scarce areas of the Middle East and North Africa (MENA)

by developing scalable and innovative financial instruments and inclusive management plans that can fully recover the costs of wastewater treatment and reuse at a demonstration site in Wadi Al-Arroub, Palestine

Current status: Wastewater

1. Connection increased until 2013 but stagnated thereafter.
   - 31% of all households in West Bank are connected
   - 72 % in Gaza Strip
   - 46% of HHs disposal in cesspits and in open streams

2. 28 % GS and 13 % WB of wastewater treated in wastewater treatment plants, **however the Treated Wastewater is not reused.**

3. Disposal of partially treated or untreated WW into the sea = (29 – 32) MCM/Yr

4. 14.96 MCM/Yr WW treated or partially treated in Israel (Treatment price = 1.2 – 2.0 NIS/m³)

Wastewater Treatment and reuse is a necessity.

The Challenges

The WWTP addresses the following major constraints:

1. High O&M costs
2. Lack of cost recovery mechanisms
3. Inefficient irrigation and water management schemes
4. Cannot apply polluter pays principle

Therefore,
Sustainability should depend on **returns** from water reuse and from **reducing** O&M costs

Our Vision

1. **Recovering** O&M costs of treatment/reuse is scalable in other places

2. **Improve** the livelihoods of 150 resource-poor farmers from the irrigation of 400 dunums of land

3. **Demonstrating** a participatory approach to a problem that requires input from multiple stakeholders, can be successful and replicated

4. **Developing** the capacity of agricultural cooperatives in Palestine

Reduction of plant operational costs

Objective: Demonstrate the feasibility of reducing the operational costs of wastewater treatment by:

1. Generate energy via photovoltaic cells
2. Using innovative, cost-saving technologies for sludge dewatering

Expected Results:

1. Generate **50%** of WWTP energy at 37.5% of retail cost of electricity
2. Reduce current cost of sludge management by **80%**
3. Reduce average cost of wastewater treatment by **50%**
4. Protection of the environment by conversion of sludge into a fertilizer

Sludge dewatering and composting

We have no choice due to…

1. Increasing environmental legislations
2. Land costs for landfill sites increasingly expensive and scarce
3. High fuel costs and air pollution if incineration is used
4. Landspreading of dewatered sludge pollutes soils with pathogens

WWTP at Wadi Al-Aroub is perfect for sludge composting…

1. Availability of land next to WWTP makes it economically practical
2. Proximity of agricultural lands to the proposed composting facility reduces transport costs
3. High demand for alternatives to expensive chemical fertilizers

Testing & improving compost quality

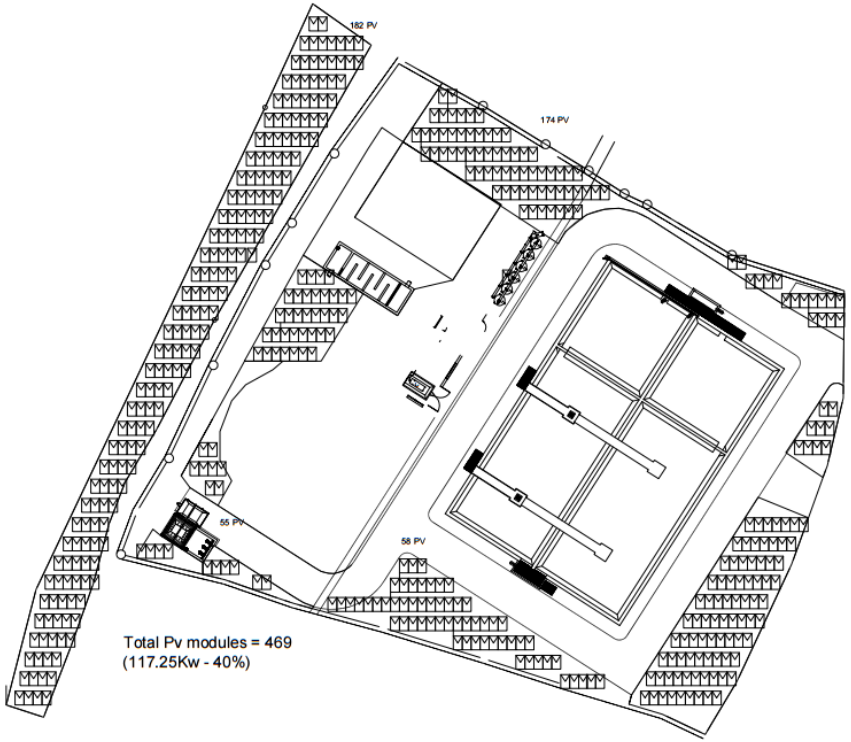
Payback period – 6 years

1. Ownership of the sludge composting facility will be transferred to the municipality of Saiir

2. Due to limited human capital, Saiir will enter a PPP to hand the O&M to a private company

Solar Energy

The investment *payback* of the 125 kWp system is between *6-9 years*



Installing of PV system will save more than €232,000 over 20 years

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the cost of SS composting (Euros/ Ton (Dry matter),

At this phase not yet available due to :

Ø working on how to minimize costs by recycling of some carbon source material (wood ships) by adding to the process a screening process to recycle wood ships.

Ø negotiating with an agronomy school close to the composting facility the possibility of obtaining carbon source at minimum costs.

ii**) the expected operating cost of TWW ,**

0.3 - 0.4 EUR /M3 (once WWTP solar be system is installed)

iii) As SS have a low C/N ratio,

The volatile solids content of the composting mix should be greater than 50% to achieve appropriate C:N ratio of 20:1 to 30:1

We are planning to use as amendment for the composting process the following :

Ø New shredded wood ships

Ø Recycled wood ships

Ø Screened Compost

We will start to test by mixing sludge dewatered at 18% dry solids content

Innovative irrigation practices

The objectives are to…

1. Introduce innovate irrigation practices that enhance water productivity

2. Increase sense of ownership of the local community in water as a resource

3. Recovering O&M costs from the sale of treated wastewater

1. Achieving maximum benefits of sound agricultural practices

Most Palestinian farmers deal with a long, inefficient supply chain. This increases prices for consumers and reduces profits for farmers.

Developing core competencies

Wadi-Al Aroub lacks the managerial, governmental, financial, and technical capabilities to manage a WWTP

We will…

- Enhance skillsets in management, testing, technical competence, and financial analysis

We will achieve…

- Sustainable operation of the WWTP facilities
- A handover of ownership and sustained, high quality compost
- Maintenance of the economic and water use efficiency of treated wastewater

Thank you