Improvement of Energy Efficiency in Pumping Stations Wala and Lib

Reducing energy costs and greenhouse gas emissions

**Background**

Energy supply and electricity generation is a challenge in Jordan as it is mainly based on imported fossil energy resources. The water sector consumes about 15% of Jordan’s electric power, a major part of this consumption goes to water pumping. Pumping inefficiency results in high costs and increased greenhouse gas emissions. Therefore, an eco-efficient and sustainable model for water pumping is crucial.

The project aims to mitigate greenhouse gas emissions and to promote a climate friendly and resource efficient economy; moreover, it uses an innovative financing mechanism mobilizing public and private investors. The project is implemented within the International Climate Initiative. Since 2008, the International Climate Initiative of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) is financing climate projects in developing and newly industrialized countries.

**Approach**

Energy saving potentials in water pumping were assessed in all major stations in Jordan. The pumping stations in Wala and Lib close to Madaba have been identified as pilot sites since they have one supply source (Heedan well field) and controllable distribution system that has recently been rehabilitated to reduce technical water losses. The impacts of the new energy efficient pumping system can be well demonstrated and monitored. The new system will allow reducing energy consumption and costs by around 20% or 313,000 JOD per year respectively.

An innovative business model with the involvement of the private sector was developed with the support of GIZ. A private consortium – comprising the Jordanian consultancy Engicon and the German pump manufacturer Wilo – formed an energy services company (ESCo), which financed the retrofitting of the pumping stations. A performance based contract will allow the ESCo to break even in the third year of operation; thanks to energy savings and proper operation.

**Heedan well field**
15 wells

**Wala Pumping Station**
6,000m³ water basin
Pumping 1,500m³ per hour to Lib (225m height difference, 2.8km distance)

**Project content**
4 new pumps
New water meter
New air relief valves

**Lib Pumping Station**
6,000m³ water basin
Pumping 1,500m³ per hour to Madaba (177m height difference, 17km distance)

**Project content**
4 new pumps
New water meter
New air relief valves

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Infrastructure

Each of the pumping stations has been equipped with four highly efficient pumps (replacing five old ones). A proper monitoring and control system has been put in place to follow up the operation and pumps efficiency. In addition, along the water pipeline 15 damaged air relief valves have been renewed to ensure smooth operation and avoid damage from trapped air. The new pumps can be equipped with variable speed drives allowing adapting to new pumping requirements (expansion or reduction in water demand) and yet maintaining efficiency.

Results and impact

- Efficient pumping adapted to hydraulic conditions
- Increased water supply security
- Lower maintenance costs due to much lower maintenance requirements compared with the old pumps
- Improved work conditions with new pumps of relatively lower noise levels
- Performance based contracting is piloted successfully to finance energy saving projects in Jordan’s water sector
- Developed local knowledge in implementing performance based projects

- Reduced energy consumption: 3.6 GWh per year
- Reduced energy cost: 313,000 JOD per year
- Reduced emissions: 2,500 tCO2 per year

Business model

The investment of 710,000 JOD is being covered by the private consortium with financial support of GIZ. The investment will be refinanced from energy savings. The savings are estimated at an average of 313,000 JOD per year and will be shared with Miyahuna on a performance based contract; Miyahuna will pay 75% of the accrued savings to the ESCo for five years. The ESCo is expected to recover its direct investment in the third year, based on its performance. Thereafter, payments of Miyahuna will be as direct profit for the ESCo. After five years of operation, the assets will be transferred to Miyahuna.

Upstream potential

There are ten well fields and 15 network pumping stations in Jordan where a similar approach could be implemented; this would result in savings of:

- Reduced energy consumption: 42.1 GWh per year
- Reduced energy cost: 3.6 Million JOD per year
- Reduced emissions: 30,600 tCO2 per year