



Increasing Energy Efficiency in Water Supply

Activity	Development of Energy Performance Contracting for energy efficient water pumps
Area	Financing
Country	Jordan
Project title	Optimization of the energy consumption of water pumping stations in Jordan
Duration	10/2008 – 11/2014
Partner institution	Water Authority of Jordan
Implementing organisation	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
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stations – more than 200 – are necessary for water pumping (well fields) and water transport (network stations). Pumping and transport of water are very energy intensive in Jordan due to the depth of the ground water reservoirs and their large distances from the consumers. The water sector is one of the biggest consumers of electricity in the country, representing 14% (2000 GWh/year) of overall consumption. About half of this is allotted to pumping activities. Many of the pumps have disproportionate energy consumption and need to be modernized. In order to reduce the financial burden for the public sector, it is vital to involve the private sector in the process of pump modernization. In the framework of the International Climate Initiative, GIZ has therefore designed this project with the aim to increase energy efficiency in water provision.

Summary

Jordan is characterized by severe water scarcity and unsustainable, energy-intensive ground water use practices. Within the framework of the International Climate Initiative, GIZ has implemented a project to increase energy efficiency in water supply. With the help of two pilot projects, Energy Performance Contracting (EPC) was identified as a suitable business model to finance the modernization of water pumps. EPC in the water sector is well applicable to other countries as well and can achieve efficiency gains of over 30% and thus contribute to a substantial mitigation of greenhouse gases.

Initial situation

Jordan is one of the most arid countries in the world. Population growth, refugee influx and economic development will further increase water demand in the future. A large number of pumping



On behalf of



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Contribution to GHG mitigation

In a first step, 25 pumping facilities were analyzed which account for a large part of the energy consumption in the water sector. The modernization of the pumps was then piloted in two projects by applying Energy Performance Contracting (EPC): A large part of the efficiency-raising measures, i.e. investment, maintenance and operating costs, is paid by private Energy Service Companies (ESCOs). Costs are amortized through the achieved energy savings which are shared between the water utility and the ESCo. In order to sustainably reduce the energy consumption of pumping stations, pumps have to constantly consume little electricity throughout their life cycle. From this perspective, EPC is the ideal business model because energy savings need to be achieved during the entire project duration in order to receive payments.

The detailed analysis revealed substantial economization opportunities for the 25 facilities: A reduction of energy consumption by 33.5 %, corresponding to energy savings of 42 GWh annually and avoided CO₂ emissions of over 30,000 t. Based on the energy tariff of the Water Authority of Jordan in 2013, this translates into annual savings of 3.3 million Euro.

Success factors

As the Water Authority of Jordan wishes to make use of savings potentials preferably everywhere in the water sector, the EPC model presents the opportunity to be applied in a larger setting. With an expected amortization duration of about 2–3 years for individual facilities, private investments and thus further greenhouse gas reductions can be expected. In particular due to the profitable two pilot projects, where EPC models were successfully implemented, the private sector became significantly more involved.

The audits which were conducted upfront provided valid information on savings potentials. Globally, the use of inefficient pumping systems is widespread and the public sector in many

cases does not have the capacity to fund the necessary modernization. Thus, this business model is well suited to be used by projects in other energy efficiency contexts and to contribute to greenhouse gas mitigation. Especially attractive is the fact that energy savings are relatively simple to measure, the project success is therefore easy to communicate.

Lessons learned

In addition to high efficiency pumps, it is essential to have adequate pumping management including sound maintenance, monitoring and data management.

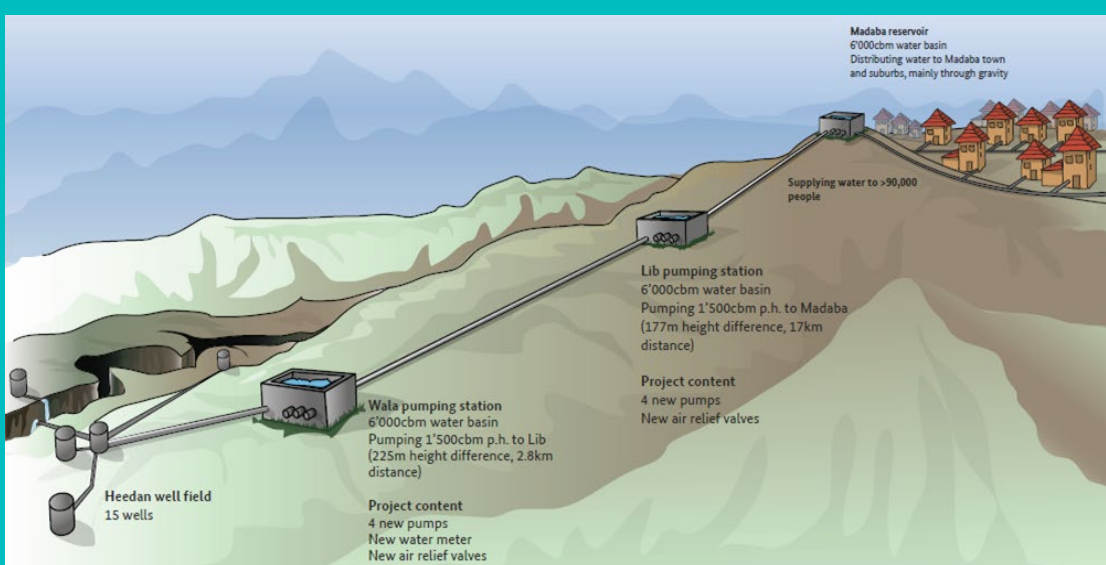
For the private sector to invest in such EPC models, it is imperative to have financing institutions readily available and interested in such projects. As the private sector will seek low interest rate loans to be able to finance such projects, financing programs with suitable conditions at commercial or development banks are needed.

It is also vital to involve a third party for the monitoring and evaluation of pump design and the retrofitting of pumping stations. This will reduce the risks of the private sector and ensure the sustainability of the model.

Wala/Lib (Madaba) pilot activity

Involves Water Authority of Jordan/Miyahuna and an Energy Service Company (ESCO) formed by Engicon and Wilo taking responsibility of O&M for 5 years.

- Investment = 726'426 EUR (GIZ contribution: 24 %)
- 8 new high quality pumps to improve the specific energy consumption from 1.02 to 0.90 kWh/m³ in Wala and from 1.1 to 0.82 kWh/m³ in Lib.
- At 9 Mm³/y of pumped water and electricity tariff (0.078 EUR/kWh, in 2013), savings would reach to 280'800 EUR/y
- Reduction in CO₂ emissions = 2'500 t CO₂/y.



Wala/Lib (Madaba) pilot activity

This project has been selected as a good practice by the GIZ project "Policy dialogue and knowledge management on LEDS in the MENA region". Within this framework, ten projects of the International Climate Initiative have been selected in total.



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