

ABSTRACT

The erection and operation of wastewater treatment plants (WWTPs) in Jordan call for high capital and annual operational expenditures. The latter is reflected through a high energy consumption of about 14% of total electricity produced in Jordan. This forms a huge financial burden on the Water Authority of Jordan (WAJ), responsible for most of WWTPs in Jordan. Of equal importance, the issue of sludge management, particularly sludge treatment, dewatering and disposal, is a critical issue. Current management option entailing sludge transportation to specific WWTPs puts high financial burdens on the WAJ. Due to technical and managerial attributes, the current management practices of WWTPs in Jordan have resulted in un-sustainable wastewater treatment facilities associated with high operational costs and severe environmental impacts. All this urged WAJ in 2011 to apply the concept of Public private Partnership (PPP) aiming at improving the efficiency of the wastewater treatment facilities.

Local experience on the application of PPP in the Jordanian sanitation sector is limited and the role of PPP in reducing operational expenditures of WWTPs warrant investigation. This research study evaluates the first experience gained through PPP involvement pertinent to energy reduction and biosolids management at Madaba WWTP. Technical management tools including operational program of selective unit operations were developed to reduce energy consumption and associated costs. The data compiled, analyzed and presented in this thesis work are based on a pioneer PPP pilot case implemented by WAJ and a consortium of private companies (Engicon-Jordan and Huber SE-Germany).

Evaluation and analysis of the compiled results obtained on the PPP after the first year of operation showed improvement in the energy efficiency and sludge management effectiveness. Compared to conventional governmental management practices, application of the PPP concept achieved an average energy consumption reduction by 25%, where the

management costs of the sludge line were reduced by 68%. Without impacting the treatment efficacy of Madaba WWTP, the PPP initiative reduced the annual operational expenditures (OPEX) and improved the biosolids disposal path. Annual saved OPEX ensured sustainable operation and reduced the overall treatment costs rendering them affordable for the urban residents. Considering the specificity of each WWTP, the PPP concept can be applied on other WWTPs across Jordan, however, the institutional framework including the legal and administrative issues regards PPP involvement need further investigations.