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DIAGNOSIS OF LIMITATIONS IN OPERATIONAL CAPACITY OF SEA WATER DESALINATION PLANTS IN GAZA STRIP

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SUMMARY – Due to the deterioration encountered in the Coastal water Aquifer both on the quality and quantity dimensions, the Palestinian Water Authority (PWA) has considered desalination as an alternative water resource in its policies and strategies. PWA has completed the implementation of a small scale sea water desalination plant while is progressing in the construction of a second plant to secure limited quantities of drinking water as an emergency solution. In the completed plant PWA has been facing considerable frustrations in front of putting the project in operation represented by limited operational capacity, weak water sector management set up, weak enforcement of regulations and the bad water culture of both the consumers and the private sector operating in this field. The factors that are limiting operation of the plants for making the maximum benefit of them should be overcome by a subsidy from the Palestinian organizations at the official level and the donor community for a limited period enough for creating a sustainable operational and management system. This will be an important exercise to create the qualifications and constructive management environment for the operation of large scale Sea Water Desalination Plant that will be erected according to the Palestinian Water sector strategic planning.

Keywords: desalination, operation, ownership, management

1. INTRODUCTION

The main goal of PWA is to manage and develop the water resources in Palestine in a sustainable way and equitable manner so that access to water in terms of quality and quantity is fulfilled. In addition the protection of water resources and the technical, operational and financial reliability are required in parallel to the main goal.

From those principles among others, the Palestinian authority represented by PWA, Ministry of planning and International cooperation and other related Palestinian organizations had included in the water master plan in year 1995 the need for small scale sea water desalination plants in Gaza Strip in order to secure limited water quantities for drinking purposes. No scenario had been proposed by that time considering big scale sea water desalination plants basically because of the high operational costs and the agenda of the peace process should include negotiations on Palestinian Water rights with Israel. Hence, the concept of small scale sea water desalination plants had been considered as an emergency solution for a transitional period. The large scale desalination has been introduced recently.

Based on the original master plan, Palestinians started to seek for financing three small scale sea water desalination plants with the donor community. They have succeeded to secure the necessary funds for a first phase from both Austria for a 600m3/day plant in the Middle area of Gaza and France for a 1250 m3/day plant in the Northern area of Gaza. The first one had been completed in March, 2003 while the second one which is 70% completed has been facing a suspension of works due to the current political situation.

Unexpected results have been found to put the Austrian funded plant in operation and the same results are expected for other future plants unless a national management plan is fixed as soon as possible. Obstacles faced and the possible scenarios to overcome them are high lighted in this paper.

2. DESCRIPTION OF THE AUSTRIAN FUNDED PLANT

The plant is capable to produce 600m3/day desalinated water with TDS 400mg/l and chlorides 250mg/l. It takes feed water from two beach wells and rejects the brine back to the Mediterranean. The plant can be automatically operated and controlled including pre-treatment incorporating for PH adjustment Hydrochloric acid instead of Sulpheric acid due to Israeli restrictions, RO process and post treatment. Treated water is collected in a 1000m3 volume reservoirs. Attached to the plant are a limited network for distribution of water through water shops & smart card machines and a filling station inside the plant for tankers filling. A second pass to reduce TDS to 150mg/l including re hardening will be added soon to the plant.

Due to its small size and the proposed methods of distribution, this plant suffers from relatively high operational costs. The two main factors contributing to the high operational costs are manpower representing 26.8% and power consumption representing 40% of the total operational costs under full load operation. Due to inability to operate the plant at full load capacity due to the reasons mentioned in the following sections, estimations for manpower and power costs are 32.8% and 31.2% respectively of the total operational costs when operated for 8 hours every third day. The total production costs of 1 m3 is estimated at $1.25 at full capacity operation and increases to $1.84 if the plant is operated for 8 hours every third day.

3. LOCAL DESALINATION MARKET

By the time Palestinians started to communicate with the donor community for financing desalination plants in 1996 and due to the formalities that must be followed, completion of the Austrian funded plant had been achieved in 2003.Almost no private sector involvement in this field had been practiced in year 1996. Currently the market in Gaza includes 18 licensed brackish water desalination plants in addition to 10 water vendors all of them are practicing distribution of desalinated water by tankers. They fill jerry cans directly to consumers or tanks for shops and supermarkets against 11 to 20 cents per 20 litres. In addition they compete in reducing the level of total dissolved solids, which reaches 40mg/l in some cases. Water culture in relation to minerals that must exist in the drinking water is absent both in the minds of consumers and water vendors. This environment of marketing has been the first obstacle towards the operation of the said plant, which represents both costs and quality competition.

4. COASTAL MUNICIPAL WATER UTILITY (CMWU)

Since the creation of the Palestinian authority, the water sector has been operated by fragmented 16 municipalities and 9 village councils, providing water to their localities with a quite wide range of different quality and tariff, while mixing revenues, expenses and administration of the water with other municipal activities. The Palestinian water Authority as a regulator had put a plan towards the creation of the so called Coastal municipal Water utility in Gaza Strip which collects the municipal water departments in a separate entity. An international operator has been planned to be recruited to work with this utility for a period of 8 years, integrating the municipal related staff with him so that the utility staff takes over after closing that contract in a qualified status for operation and management. Unfortunately no international operators were interested at this stage for such an operation contract due to the political environment. The plan had been modified to have a management contract for 3 year duration so that risk on contractors is reduced. Bidding is in progress, but still results are not guaranteed if the political situation stays without improvements.

It has been planned that the Austrian funded plant will be operated and maintained as any other component of the water infrastructure by the international operator and later by the CMWU. Delay in the existence of this entity has been representing another frustration in front of the operation of the plant.

PWA has investigated possibilities of operating the plant and marketing of water by municipalities in the area with some subsidy from the government, thus forming a small utility to be qualified in the future since they should be part of the operating team of larger scale installations sooner or later. This investigation has been faced by the fact that municipalities are facing sharp financial problems due to

the low collection rates from consumers, illegal connections on the distribution network which municipalities are not able to control, limited financial allocations form the government, all of that is added to the technical operational capacity of the municipal teams. In other words there is no guarantee that people will pay for this high quality and costs water if purchased from the municipality. More than that, municipalities are not able to pay for the water purchased from the Israeli company Mekorot and consequently the Israelis are deducting the value of water purchased from the Palestinian Authority taxes.

5. LOCAL PRIVATE SECTOR OPERATIONAL POSSIBILITIES

Due to the absence of the CMWU and its proposed operator or management contractor by the time the desalination plant was completed, PWA had awarded a contract to a local governmentally subsidized firm in order to operate the plant and market the water. This firm had not proven a capacity in marketing product water. The contract had been closed after one year without noticeable progress in possibilities of efficient operation of the plant.

PWA has investigated possibilities of involvement of the private sector for operation of the plant and marketing of water. Those who had been contacted are the most qualified firms who own and operate their private brackish water desalination plants and distribute water by tankers. The private plants when reviewed in most cases are simply reverse osmosis membranes with a high pressure pump fixed next to water well. No sophisticated pre-treatment or post treatment is included. In addition no clear and reliable work plan has been presented by the private sector for marketing of water. Meanwhile family business with limited financial capacity and without ability to offer reasonable guarantees governs this type of business. This will put the plant under technical and financial risks if handed over to such firms for operation. Currently PWA has been contacted by other firms in the private sector as investors not related to the water sector requesting negotiations on an operation contract. PWA is dealing with this subject with great care so that it will avoid the involvement of irrelevant operator.

6. LEVELS OF SOLUTION OF THE WATER CRISES IN GAZA

It is well understood that investing in the small scale sea water desalination plants has been overlooked as a short term solution. The purpose is to provide limited quantities for drinking while the distribution system is clear to be complicated and exhausting. A medium term solution has been inserted in the water sector plans. This is represented by the construction of a large scale sea water desalination plant that can provide to Gaza Strip along with other resources such as waste water reuse & recharge and storm water harvesting the current and medium term deficits in water quantities. The long term solution which is still valid in the opinion of Palestinians is the water rights that should be discussed in the final stage of negotiations with Israel. Regional integration of Palestinians with neighbouring countries in relation to discussions on regional water deficit is a longer term solution.

7. FUNCTIONAL INTEGRATION OF WATER SUPPLY SYSTEMS

According to the Palestinian water law, PWA should act as the regulator that monitors operators and water users within a framework of sustainable and integrated water resources management. The CMWU in Gaza (and other utilities in the west Bank) should show the responsibility of an owner. It should provide the general management, supervise service providers and look for the relation between them and the consumers. The supply and operation is assumed to be covered by the private operator for a transitional period. He should provide the direct management, operation and maintenance and sales. After this transitional period it is foreseen that water utilities shall react as owners and service providers. The users or user organizations are the recipients of the service. They should not only pay for the service but also they should be represented in the management. They should be aware of the challenges that are facing the water service and the value of water. Thus the creation of a water culture that contributes to the sustainable management will be some thing that deserves the investment.

8. SHORT TERM PLAN OF OPERATION

Based on the above it becomes clear that an exceptional set up should exist for a transitional period. PWA will contract a professional manager capable of water marketing. The manager should appoint his limited operational and administration staff keeping in mind that he will never succeed without a subsidy from the government and the donor community. Part of the product shall be distributed in Bulk to municipalities while quantities to be distributed by tankers and water shops should be carefully estimated to avoid the sharp financial damage in operation. While less financial damage may be faced at low production rates, increasing operating hours shall be phased. A program of desalinated water supply to schools and clinics shall support greatly the operation of the plant. This system shall replace the small domestic desalination units installed at such organizations due to the high unseen operating costs and the non guaranteed water quality. The tariff that can be applied shall be equal to the operating costs with a small margin of profit.

9. CONCLUSIONS

1. Delay and obstacles facing the plant operation do not mean that Gaza people do not need this good quality water.
2. The Water sector set up has not been proceeding as planned. This has created an ambiguity towards the owner ship of the plant.
3. The plant can not be operated under the current political situation as an investment project.

10. RECOMMENDATIONS

1. The plant and other future plants should be subsidized by the Palestinian Authority and the donor community. Palestinians should show the responsibility of plant ownership and should communicate at the national level to define duties and responsibilities.
2. The operator shall have access to supply desalinated water to schools and hospitals. Both related ministries shall pay for this service through a contract with the operator.
3. A plant manager should be selected carefully so that he can plan well the schedule of operation of the plant in comparison with quantities to be distributed and the revenues expected.
4. The regulator should review licensing procedures and conditions for the private sector desalination business.
5. Public awareness among consumers and water producers in relation to water quality should be paid a special attention by the regulator and the donor community.
6. Creation of a well qualified local staff in operating water installations is a must in order to facilitate dealing with bigger installations in the future.

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