ABSTRACT

The Government of the Sultanate of Oman decided in 1999 to open up and privatize the whole electricity sector. This was considered part of Omani economic reforms that have taken place since the third and fourth five years plans instigated by the Government.

As part of the electricity privatization process, it was decided to fast-track the implementation of some projects to enhance the infrastructure of power supply, due to the high demand from new and existing customers. The Barka power and desalination plant was one of the projects approved by the government to be executed by the private sector during this period. It was the first dual purpose power generation and desalination plant, 100 percent owned by international and local investors. The capacity of the first phase of the plant is 427 MW and 20 MIGD.

This paper highlights some issues of privatization of desalination plants associated with power generation in Oman, for which the Barka power and desalination plant will be considered as a case study.

INTRODUCTION

The history of major desalination plants in Oman goes back to early 1970s when it was decided by the government to build the Ghubrah power and desalination plant in the Governorate of Muscat, to meet the high demand for potable water for domestic purposes, due to the fast development of the country, population increase and rapid rise in living standards.

Today, five Wilayats out of six in Muscat depend mainly on desalinated water for their daily water supply in order to meet domestic, industrial and commercial demand. The installation capacity of the Ghubrah plant, which comprises of seven multi-stage flash units with associated steam and gas turbines units, is now 41 million imperial gallons per day (MIGD). The average daily production in 2003 reached 33 MIGD.

Until this year, the government of the Sultanate of Oman was responsible for the supply of electricity and potable water supply. Based on the (international and local) experience of the Manah Power station in the mid nineties, and the outcome of the study, "Oman Electricity and Related Water Sector Privatisation" in 1999, it was decided by the Cabinet to open up and privatise the electricity and related water sector. The study recommended that before the process take place, certain fast-track projects should be executed to strengthen the infrastructure of the power and water supply. The Barka Power and Desalination Plant was one of these such recommended projects that was chosen to be implemented by the private sector on a Build, Operate and Own (BOO) basis, for 15 years from the commercial operation date (COD). It was decided to start plant construction in 2000, to be completed by 2003.
BARKA POWER AND DESALINATION PLANT

Background

The project tender was floated by the Tender Board on 30/04/2000 and bids by three international bidders were received on September 4th, 2000. The successful bidder, AES BARKA of USA and its local partner Multitech signed the contract document on November 26th, 2000 and the Commercial Operation Date was set on April 4th, 2003. The main plant contents, agreements, environmental and other contractual requirements are listed below.

Main Plant Contents

- Three MSF units (each 6.7 MIGD), No. of stages 16 heat recovery +3 heat rejection.
- Two Gas Turbine each rated at 117 MW with generator 159 MVA each at reference condition of 50 C and 100% humidity.
- One Steam Turbine rated at 222 MW with generator 280 MVA.
- Fuel Facilities (Natural Gas and Fuel Oil as supplementary).
- Two heat recovery steam generator (HRSG), with supplementary firing, including demineralisation water treatment for boiler.
- Sea Water Intake and out –fall facilities for phase (I) and (II) (Four sea water embedded pipes, length of the pipes is 1200m and diameter 2.2m for intake and 2.5m for outfall).
- Control and administration building.
- All ancillary facilities (transformers, switchgear, fire fighting facilities, etc).
- Remineralisation plant (CO2, limestone, chlorination, fluoridation, etc).
- Roads, Security fence and system,

Main Agreements.

- Power and Water Purchase Agreement (PWPA).
- Natural Gas Sales Agreement (NGSA).
- Usufruct Agreement (land lease).
- Master Novation Agreement.
- Founders Agreement.
- Performance Bond.
- Omani Contents and Omanisation.

Environmental Requirements

An Environmental Impact Assessment (EIA) study was undertaken and the results of the study were better than the parameters mentioned in the Agreement.

The fuel for Barka plant is natural gas which has low Sulphur content of 5 ppm or less. The main by-product of the combustion is water vapour, carbon dioxide (CO2) with the limit of 40 mg/nm3, and oxides of nitrogen (NOx) with the limit of 60 mg/nm3. The Sulphur dioxide (SO2) and particulate (smoke) associated with coal or oil produced other than in trace amounts.

Plant emission and noise levels are controlled to meet the requirement of Ministry of Regional Municipalities, Environment and Water resources and World Bank Guidelines. Using Dry low NOx (DLN) combustion significantly reduces the NOx, which is the main environmental concern in the gas-fired plant. NOx levels during plant performance testing have been well below the required levels.
Clean water after treatment has been used inside the plant for landscaping. The seawater outfall has been designed to minimize the thermal effect of the circulated seawater that is returned to the marine environment.

**Tariff**

Usually the tariff of an IP (W) P is divided into two sections, namely the capacity charge and the energy/water output charge. The capacity charge consists of an investment charge and a fixed operation and maintenance charge. Adjustments are made toward scheduled unavailability of the plant and/or units, forced outage and de-rating of the plant. The calculation formulae also take into account the inflation and exchange rates. The energy/water output charge consists of a fuel charge, variable operation and maintenance charge and number of start-ups of the units above those offered by the project company.

**Why Privatise Desalination plants**

Recently in the Gulf countries, the trend has shifted responsibility for implementation of desalination plant projects from governments to the private sector. This could be attributed to the following factors:

- Desalination projects need significant capital and their operation expenditures can affect the civic budgets and thereby influence government spending on other priorities. Governments call for public/private partnership, to help share these costs and responsibility.
- Due to higher comparative costs of production for ground and natural water, high subsidies are required. The private sector focuses on the subsidies and makes efforts to reduce them with higher technical, operational and financial efficiencies and performance.
- Large sums of foreign and local investment for a longer time can be attracted.
- The desalination industry can be regulated with proper contractual obligations and duties. This would guarantee security of supply, particularly by the private sector.
- Capital markets can be stimulated with new capital and participants.
- The project implementation period can be shortened by the private as compared to public sector and the plant lifetime can be lengthened due to higher quality maintenance available privately.
- The technology of desalination is closely associated with electricity, underlining the importance of efficiency and performance of the plants.

**CONCLUSION**

Desalination is partly a solution to water shortage problems in water scarce countries such as those in the Gulf. It comprises a significant yet vital part of economy in Oman. However, due to higher costs of desalination compared to natural water, subsidies are required. The private sector is therefore encouraged to participate in building, operating and owning desalination projects. Local and international investors have a readiness to invest in the desalination business and in general, it is important to accumulate local experience in the field of desalination operations, manufacturing, research and development, projects execution, etc. Several sectors can benefit from the privatisation of desalination plants, such as capital markets, local trade, manufacturers, contractors, investors etc. However, regulation is necessary and performance, efficiencies, timing, quality control, etc could be enhanced through better conditions of contracts. Thus, it is important to spread awareness about privatisation, and especially as relates to desalination, to the public.