ISRAEL

Applications of the MBR technology in the Middle East

The water supply system in Israel is currently undergoing a deep crisis. The main reason is a sequence of three consecutive dry years that resulted in depletion of the large potable reservoirs - the mountain aquifer, the sea of Galilee and the coastal aquifer. Further pumping from these reservoirs may cause an irreparable increase in salinity. In order to overcome the crisis, the government has taken a number of emergency measures. First, it was decided to immediately begin with desalination of saline and sea water. The first 50 million cubic meters per year BOT contract has already been awarded at a cost of 52.7 cents per cubic meter. Additional measures taken by the government include encouraging end-users to replace potable water with recycled water where possible. Utilization of the emerging membrane technology in wastewater treatment, and the resulting high-quality effluent produced, fit well within the goals set by the Ministry of Infrastructure and The Water Commission. It is expected that over the next few years, MBR technology will be used in a number of different applications, some similar to those found in other countries, and some which are unique to specific Israeli conditions.

The total water supply potential in Israel from all sources is 1.800 million cubic meters per year. The rainy season lasts only four months per year, from November through February. The potable water supply to the main three sectors - agriculture, industry and the residential sector - is based on three main reservoirs: The mountain aquifer, the Sea of Galilee and the coastal aquifer. These reservoirs serve as seasonal and multiannual operational storage, while recharge takes place during the rainy season. The level of recharge depends mainly on the quantity of rainfall and its distribution throughout the country.

The drought experienced over the past three years has resulted in a deficit of 500 million cubic meters of water and, when added to the pre-existing deficit, now brings the deficit to some 2.000 million cubic meters, or the equivalent of a full year's water supply.

It is estimated that the country will require 2.200 million cubic meters of potable water annually by the year 2020. This estimate assumes that agriculture will remain at its present size of 200.000 acres which consume over 1.000 million cubic meters. However, it is estimated that only 50% of the water supply for agriculture will consist of potable water.

The balance of 500-600 million cubic meters will be supplied from recycled water. Consequently, 500 million cubic meters of potable water will be diverted for residential use, and combined with 400 million cubic meters of desalinated water will supply the demand of population which is estimated to reach over eight million people by 2020.

It is however clear, that such an ambitious program for replacing of drinking water by recycled water requires excellent reclaimed water quality, including the need to desalinate effluents in order to allow irrigation over the main aquifers without causing soil and groundwater salination.

Current status of wastewater treatment

Most WWTPs were built during the last 15 years. The requirement for effluent discharge at a minimal standard of 20 mg/l BOD and 30 mg/l TSS, which become legally binding in 1992, accelerated the construction of new activated sludge plants.

Today, most of the wastewater in Israel is treated to secondary level, while extensive nitrogen and phosphorous removal take place in only a number of plants.

The largest water reclamation project is located south of Tel Aviv. Secondary effluent from the Dan Region WWTP, the largest activated sludge plant in the country (treating 130 million cubic meters per year), is recharged into a dedicated section of the coastal aquifer through spreading basins. The effluent is then re-pumped out of the aquifer and conveyed to the Negev, the country's southern region, where it is used for unlimited agricultural irrigation.

In additional local reclamation projects secondary effluents are utilized for limited irrigation, depending on the effluent quality, the type of crops grown, and the locally applied standards.

Government policy regarding recycled water

The Ministry of Infrastructure and the water commission have instituted a policy intended to encourage the use of reclaimed water where possible. Some of the measures taken are listed below:

- Municipalities which desire to construct a WWTP utilizing government subsidy are required to present a comprehensive program for effluent reuse, for both the dry summer season and the rainy winter season;
- Potable water prices have been increased for all sectors;
- A differential pricing system was set up to encourage water conservation;
- Water quotas for agriculture and for local authorities have been cut;
- A national master plan for effluent reuse was prepared, which will allow gradual replacement of potable water with reclaimed water over the next 20 years;
- A subsidy of up to 60% will be granted for investments related to water reclamation projects, which will promote replacement of potable water with reclaimed water.

Application

The main advantages of utilizing the MBR are listed below:

- high quality effluent supplied at high reliability;
- the option to decentralize erection of WWTP for sites distant from main collection systems while reclaiming the water for local use;
- MBR effluent is an ideal pretreatment method for RO because it allows utter removal of suspended solids and colloidal materials reliably and without chemicals;
- the combination of MBR and RO allows effluent desalination;
- reclaimed water for industrial usage for a variety of applications including cooling water, boiler feed water etc.