1000+
ESTIMATED OPERATIONAL DESALINATION PLANTS IN INDIA

Turning to the sea

Can desalination solve India's water woes? **Imran Mirza** explores

India's growing water requirements are a cause of concern. With limited freshwater resources and erratic rainfall, supply of water for domestic and industrial consumption is emerging as a big challenge for the central and state governments. While there are many options available, seawater desalination has emerged as a viable alternative to meet the country's rising water demand. But is this technology suitable for Indian conditions, considering the costs involved?

STATUS QUO

India's total water demand is likely to go up to 1,400 Billion Cubic Metres (BCM) by the year 2050. The water available from current sources will not be adequate to meet future needs. The government is looking at alternative sources to bridge this demand-supply gap.

Water stressed regions such as the Gulf depend extensively on desalination to meet their water requirements. India can take a cue from these regions and look at desalination as an option. The country currently has more than 1,000 operational desalination plants in different locations. Reports suggest that the Indian desalination market is likely to grow at a CAGR of more than 25 per cent in the next five years. The market for desalination services in India's five major coastal cities: Mumbai, Kolkata, Chennai, Surat and Vizag stood at 5,815 Million Litres per Day (MPD) and is expected to grow at a CAGR of eight per cent.

Most new power plants are being set up in the coastal areas, primarily to meet their water requirements through desalination. This has worked positively for the desalination industry. Other water-intensive industries such as chemicals, pharmaceuticals and refineries will also add to this requirement.

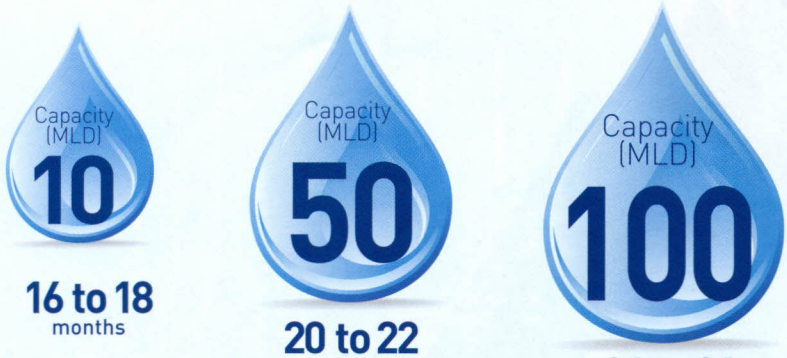
REVERSE OSMOSIS VS THERMAL DESALINATION

The Ministry of Earth Sciences is working on promoting conversion of sea water into potable water using the low temperature thermal desalination (LTTD) technology. It has already started work on installing sea water desalination projects based on LTTD technology in cities across India. The UAE, with no real freshwater resource, is primarily dependent on gas-based desalinated sea water to meet its water requirements.

However, many feel that reverse osmosis (RO) technology is more suited for Indian conditions. "The raw water quality for desalination in India is such that all types of desalination technology can be used, however, the power situation as well as the average size of desalination plant makes the Reverse Osmosis ("RO") a more suitable technology for the most part," says Amanullah, CEO, SPML Utilities Limited. "The thermal process is much more capital intensive and can pay back against the RO only when there is a free supply of energy in terms of waste heat or energy available," says Dinesh Sadasivan, executive director and CEO, Ion Exchange Services Ltd. At the moment most desalination plants are RO based and same trend is expected to continue in India.

According to a report by TechSci Research, membrane-based technologies are 23 per cent cheaper for generating desalinated water when compared with thermal-

Average time for building a RO-based desalination plant, including complete scope of intake and rejection of brine disposal to sea



Source: L&T Construction

based ones, due to which, 85 per cent plants in India are membrane-based plants.

WHY HASN'T DESALINATION PICKED UP IN A BIG WAY?

Although states like Tamil Nadu and Gujarat were quick to adopt desalination and have successfully set up many plants in recent years, the acceptance has been pretty low in other states.

The major disconnect and challenge lies in the fact that there is a huge gap between water tariff expectations and the actual cost of desalination per KL. "From time immemorial, the consumers in India are used to pay very little for water. Only recently, for example, in few of the municipalities in India, the water tariff has been set around Rs10/KL and tariff moves up in steps of usage," Amanullah explains.

In one estimate, in the case of producing water using desalination, O&M cost alone — including cost of power, chemical, membrane replacements and cost of highly trained skilled professionals — is in excess of Rs35 per KL desalinated water. Cost to set up the desalination plant is of course additional. "Further, the raw water quality in India is such that it often requires a complex pre-treatment system, driving up capex and the O&M cost, which again has negative impact on the cost of producing desalinated water," adds Amanullah.

Another major challenge is the availability of power. In order to run a successful desalination plant, access to a stable uninterrupted 24x7 power supply is a major requirement.

Many believe that wastewater treatment is a better option as wastewater is readily available from every domestic household, small institutions, commercial establishments, industries, etc., whereas desalination is only possible in the coastal regions. Reusing wastewater also ensures that the natural water bodies are not polluted since wastewater is not disposed into them. "However it needs to be kept in mind, that mere treatment of wastewater can only yield water which can be used for horticulture, irrigation and industrial applications.

To meet drinking water demands, wastewater needs to be treated to the highest level and the process is also complicated. Also, there is a huge mental block to use treated wastewater for drinking purposes," says a spokesperson for Veolia Water India.

TECHNOLOGICAL IMPROVEMENTS

In RO, the primary cost of producing desalinated water is power. "Significant developments in high pressure pump technology and energy recovery devices have increased efficiencies and hence lowered the requirement of power," says Sadasivan. With the availability of nuclear and solar-powered desalination plants, the cost per unit is also expected to go down significantly.

Another area of significant development has been in the areas of membranes that are now able to offer better efficiency of removal and performance. All these factors combined together offer the best developments in technology. "Another aspect is standardisation of skids for larger flow rates (20 MLD) giving significant economy of scale," adds Sadasivan.

Recent developments such as increase in the size of desalination plants, drop in costs of membranes, and enhanced membrane life have brought down the capex and operating costs. The cost of RO-based plants has gone down by nearly 60 per cent in the last 10 years. The cost of water produced through desalination has also decreased to as low as Rs10 per m3.

Critics have pointed out the adverse effects of desalination on the surrounding coastal areas as the brine generated during the process is dumped back into the sea, affecting the flora and fauna. However, recent developments in filtration technology have helped in reducing waste salts and brine generated during the process. Zero-discharge desalination plants separate the salts into saleable products, making desalination more environmentally-friendly.

SUMMING IT UP

While desalination can help in minimising water shortage in the country, it is by no means a comprehensive solution. The country needs a combination of various sources to meet its requirements. Desalination, wastewater treatment and similar technologies can prevent India's looming water crisis. Active participation from the public and private sector is needed to make this a reality. CW

SPECIAL GEOGRAPHICAL REQUIREMENTS FOR DESALINATION PLANTS

- Availability of sea water at shorter distance from shore, not polluted, away from sensitive marine life
- Availability of land close to intake point to construct plant (to keep pumping distance as short as possible for transport of sea water to the plant and reject brine from the plant back to sea)
- Optimum location of sea intake point based on the Bathymetric Survey as this has direct bearing on project cost and construction schedule

Source: L&T Construction