Desalination Market 2013 – 2023 Commercial, Technological & Strategic Developments in global desalination

GMR Data

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- 75% of the earth is covered in water,
- 97% is salt water from the oceans;
- only 2.5% of the earth's water is fresh water
- Of that 2.5%, 69% is frozen in glaciers and ice caps.
- This results in just 0.75% of the total water on earth being fresh ground water

Water scarcity is a problem to some degree in every continent. This water scarcity leaves some countries little alternative than to build desalinisation plants to remove salt from sea water or other salinized / brackish water.

In water stressed regions public municipalities have historically provided any desalinated water, but as the scarcity of water is increasing, the private sector is becoming increasingly involved in this market to provide wholly privately owned and operated desalination plants. Desalination has had a long history for small scale water production, but more recently it has become widely accepted as a large utility scale water solution provider.

The desalination processes utilise not only seawater but 'brackish' or 'grey water' from rivers and wells to produce clean, potable water. Water from seas and oceans has a much higher total dissolved solid (TDS) content than brackish water and has to be purified more intensively.

Sea water is often drawn from beach wells near the sea, so that the water drawn is somewhat clearer and has lower TDS. Thames Water's new desalination plant in Beckton (London, UK), for example, takes water from the outgoing tide of the River Thames, when it contains a much lower salt content, which reduces the amount of energy and time needed to desalinate the water.

Currently seawater represents 62.4 per cent of the desalination market in terms of output. Brackish water desalination represents another 20 per cent, followed by river water desalination at 7.5 per cent

The plant at Beckton is an important mile stone in the global desalination sector, not due to its size or technology, but due to its location. The construction of a desalination plant in the UK, a country generally viewed as having sufficient fresh water, was initially pitched as emergency back-up but in reality is becoming an important source of Thames Water's overall available water mix.

The Middle East is the largest proponent of desalination plant construction and as will be described throughout this report the ME will lead the global market over the period 2013-2023, but what must not be underestimated are the global markets that need fresh water. These emerging markets need increased access to fresh water for population increases, increasingly industrialised agriculture practices and to combat increasingly under-funded, aging fresh water infrastructure.

1.2 The Desalination Market Overview

Desalination is a process that cleanses seawater, river water and brackish water primarily of salt and other unwanted dissolved solids resulting in an end product - potable quality water. Historically the primary techniques of desalination procedures revolve around vaporising water and condensing it into its potable form, however more recently technological developments have brought a number of membranes based desalination systems that purify sea water to the forefront of the market.

Multi-stage flash distillation (MSF) is the most common desalination process that distills sea water by flashing a portion of the water into steam in multiple stages of countercurrent heat exchangers. Multi-stage flash distillation plants produce 80% of all desalinated water in the world. MSF has been used in various formats throughout history and then industrially since the 1940's.

Reverse osmosis (RO) is a process through which filtered seawater is forced under very high pressure against permeable membranes. The membranes are so fine that they can filter out molecules, including salt and some bacteria, purifying the source water to potable standards.

Due to its lower energy requirements RO has lower costs and therefore net revenues generated from reverse osmosis plants tend to be higher than other thermal processes.

Other technologies, besides filtration and evaporation for desalination involve electrodialysis and its conjugation, electrodialysis reversal. These methods use direct current electricity and ionic filters. Each of these technologies make use of different materials, operate at different hydraulic pressure, and have variations within those niche methodologies and that makes this market an ever-changing and ever improving place.

1.3 Drivers & Restraints of the Desalination Market 2013-2023

Table 1.1 Drivers & Restraints in the Desalination Market 2013-2023	
Drivers	**Restraints**
• **Insufficient ground water** • **Insufficient desalination plants** • **Under maintained / non-existent water infrastructure** • **Fast population growth** • **Reduction of water import bill**	• **High operational & installation costs** • **Insufficient access to salinized / brackish water sources** • **Modern well maintained water systems** • **Errors in forecasting the optimal size of plants / future water demand**

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1.3.1 Drivers

Insufficient ground water

Massively increasing urbanisation; increasing numbers of the population living in cities and towns, has put huge pressure on the traditional ground water supplies.

Not only denser populations in the urban environment but an overall increase in the population as a whole further stretches the ground water limitations.

Increasingly industrialised agriculture is another major drain on the finite ground water levels. Dialogue between major farming groups and local authorities will become increasingly common when issues of water usage come to the fore.

All of these strains on ground water drive countries to look at progressive ways of ensuring their populace do not run out of water and one of the most obvious sources of new water is in the desalination sector.

Insufficient desalination plants

As the popularity of desalination has increased, so has the acceptance of governments to invest in desalination R&D and to purchase desalination plants. This process has taken decades from initial ideas up to the modern industrial scale desalination plants we see globally today.

Historically the Gulf region has had the largest market for desalination plants but today we see large scale plants built in Israel, Australia and Spain. Even European countries generally perceived as having plentiful fresh water supplies have suffered increased periods of drought and are seeking alternatives to their historic fresh water supplies.

The increasing likelihood of drought affecting western countries as well as the traditional de-sal savvy gulf states means that desalination and the associated de-sal infrastructure market will grow in two distinct ways. In the preventative sense to alleviate potential droughts and in the other sense as a constant source of water within a countries total water sources.

Under Maintained / Under Developed Water Infrastructure

Many countries globally lose very high percentages of the treated drinking / mains or fresh water in their distribution systems via leaks, evaporation and other losses.

Table 1.2 Percentage of Mains Water Losses per Country

Country	Losses (%)
Egypt	20-25%
UK	20-25%
Ireland	25%
Qatar	30-35%
Brazil	40%
Italy	40%
Iran	50%

(GMR Data 2013)

Every country suffers mains water losses, to what extent these losses total are variable, but 20-25% is normal for many western countries. These losses are of course huge to countries and make up many billions of gallons of mains water lost globally every year.

If countries spend money on their existing water systems and allow a modern, well maintained water system, that allows fewer leaks; this could in many cases negate the need for desalination plants. However countries are increasingly likely to invest in desalination plants to fix this issue rather than the expensive and complex up-gradation of their existing water infrastructure.

Fast Population Growth

The UN forecasts that by 2030 there will be global population of 8.2bn, with 60% then living in urban areas;