America's Authority in Membrane Treatment

AMTA

American Membrane Technology Association

Improving America's Waters Through Membrane Treatment and Desalting

Future of Desalination in the United States

As the nation's population and industrial development grows, so does fresh water use. Along with this increase in water use, the availability of traditional water supplies is declining while the costs of these supplies are on the rise.

According to a former director of the National Oceanic and Atmospheric Administrations' Office of Hydrology, "As we move toward the 21st century, short supplies of clean water could rival expensive oil as one of the nation's most serious concerns." Traditional surface water development sites: dams, reservoirs and aqueducts have already been used, and many proposed projects are not feasible due to significant environmental concerns, lack of funding or the high initial capital investments required.

There are, however, several options for augmenting, increasing or extending existing freshwater supplies. Conservation has been, and will continue to be, the easiest and most cost-effective means of managing water demands. However, there are limitations with the amount of water that may be conserved. Recycled treated wastewater, or "water reuse" can sometimes replace existing freshwater supplies for non-potable and some limited indirect potable uses.

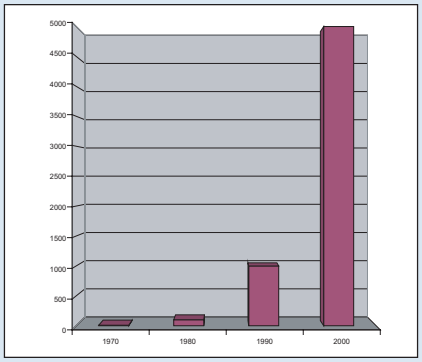
The need for additional water supplies has forced water agencies to look for new sources of supply, such as the ocean and brackish groundwater aquifers. Ocean water desalination is a vast water source that remains untapped in significant quantities in the United States. Over three-quarters of the earth's surface is covered by water too salty to sustain human life or farming. Also, many freshwater-short areas have access to brackish (moderately salty) water. Desalting, or desalination, is a process used to create new freshwater supplies by separating salt and other dissolved minerals from sea water or brackish water. Other contaminants, such as dissolved metals, arsenic, pathogens, organic matter and radio-nuclides, are also removed by membrane methods.

The United States currently has over 1,300 desalting plants, most used to desalt brackish groundwater. In the future, desalting will be further utilized to help meet growing freshwater needs.

Desalination Across the Globe

In 2006, desalting plants worldwide had the capacity to produce over 11 billion gallons a day of freshwater. In many arid areas of the world desalted water provides the only source of fresh water. Improvements in membrane technology over the last decade have seen membranes surpass thermal processes in worldwide desalting capacity. This trend will continue to increase as membrane efficiencies continue to improve.

Growth of Worldwide Membrane Desalination Facilities



Past Research Funding and Technological Advances

The desalting process dates back to the 4th century BC when Greek sailors used an evaporative process to desalinate seawater. Desalting use increased dramatically in the last half of the 20th century, enabling areas with limited or no freshwater supplies to grow and flourish.

Many of the advances in desalination technologies in the past four decades were made possible by US government research funding. One of the most concentrated efforts was the creation of the Office of Saline Water (OSW) in the early 1950's and its successor organizations like the Office of Water Research and Technology (OWRT). From the early 1950's through 1982, when federal funding for most desalting research was discontinued, the US government actively funded research, development and demonstration projects , allocating about $900 million (in 1985 dollars) in the process.

This funding helped to provide much of the basic investigation of the different technologies for desalting seawater and brackish water. For instance, the research program was primarily responsible for the development of reverse osmosis, and for many advances in distillation technologies.

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Future Prospects for Desalting in the US

- Membrane technology will be increasingly employed in ocean water, groundwater, and recycled wastewater treatment facilities as membrane efficiencies continue to improve.
- Membrane technology will be used increasingly to improve taste, odor and color in drinking water and for water softening.
- Industries will increase the use of membrane technology to remove impurities in the water used in their operations, and to remove potentially toxic contaminants in their effluent, and for production of ultra pure water.
- Within the next 10-20 years, many coastal communities in USA (e.g. Florida, Texas, California) will make seawater desalination a permanent part of their water supply portfolio. This new approach allows them to access a reliable, drought proof source of supply that can be developed and controlled locally.
- The use of membrane-based "point-of-use," or home treatment, units is increasing in response to individual concerns about water quality.

Implementation Challenges

While membrane desalination technologies are in use across the nation, key implementation challenges remain. As planning and permitting continues for new seawater desalination facilities in California, Texas, and Florida, intake and discharge strategies are being explored to minimize the plant's impact on the marine environment. For inland desalination facilities, the focus is on the development of cost-effective concentrate management alternatives.

Need for Additional Research

Membrane technology must continue to be developed to its full potential to help meet the nation's growing water needs. To meet this challenge, there is a need to continue direct federal support of desalting and other membrane research, development and demonstration projects. Federally supported research and development will not only benefit all users of desalting technology in the US, but will also improve the competitiveness of US firms overseas.

This material has been prepared as an educational tool by the American Membrane Technology Association (AMTA). It is designed for dissemination to the public to further the understanding of the contribution that membrane water treatment technologies can make toward improving the quality of water supplies in the US and throughout the world.

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