

# Global Market for Membrane Wastewater Treatment

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## Abstracts

Wastewater is, at once, an environmental hazard and a potentially recoverable resource. Generated from a wide array of processes and activities, wastewater may contain hazardous toxins, heavy metals, oils and greases, nutrients, bacteriological components, viruses, pharmaceuticals, and an array of other pollutants. If released into natural or managed waters, these pollutants can contribute substantially to downstream water quality impairments and impact both human health and ecosystems. Fortunately a wide array of wastewater treatment technologies is available, including physical treatments, chemical treatment, biological treatment, screening, and membrane filtration. These technologies, which remove, destroy, or transform pollutants into less harmful by-products, are varied and highly specific based on wastewater characteristics, volume, needed process flow rates, and the ultimate disposal or reuse selected for the treated wastewater.

Membrane wastewater treatment technologies were introduced in the laboratory in the 1950s and 1960s. By the 1990s, membrane cleaning (rather than simple replacement) was incorporated into product design, allowing use for the treatment of drinking water and production of recycled wastewater. Today, membrane wastewater treatment technologies are advancing rapidly, spurred along by a series of incremental technological advances, are smaller, cheaper, and more efficient, and are being deployed for a widening suite of wastewater applications. As a result, U.S. and global markets for membrane wastewater treatment technologies are blossoming from their once limited niches and into mainstay applications for municipal and industrial wastewater treatment.

Membrane wastewater treatment technologies that are currently available can be broken down into four categories: low pressure membranes including (1) microfiltration membrane systems, which include membrane bioreactor (MBR), physical microfiltration, and prefiltration applications; (2) ultrafiltration membrane systems, which utilize a

smaller pore size than microfiltration, capable of removing bacteria and viruses; and high pressure membranes including (3) nanofiltration, which is also capable of removing most chemical pollutants and multivalent ions, and (4) reverse osmosis, which can also remove monovalent ions (salts). Applications for membrane wastewater treatment technologies include treatment of both industrial and municipal wastewater, in support of discharge to natural waters or other disposal; prefiltration, especially where low pressure membranes are applied in sequence with high pressure membranes; reclamation for recycled water including municipal, agricultural, and industrial reuse; and emerging applications including potable water supply enhancement.

Persistent and ongoing membrane cost reductions over the last two decades, combined with updated technologies that are cutting O&M costs, are driving strong demand for membrane wastewater treatment technologies. Public sector demand and regulatory statutes are also driving more widespread implementation of wastewater recycling, to which membrane technologies are well suited. Membrane technologies also provide effective treatment in a fraction of the area required for conventional treatment. In developed nations, membrane wastewater treatment technologies are being selected because they provide high quality, consistent treatment to meet increasingly stringent discharge requirements and ever lowering pollutant detection limits. In developing markets, installation of membrane wastewater treatment technologies is driven by increased wastewater concerns associated with recent and ongoing industrialization, combined with demand for portable and remote systems, and an increasing reliance on high quality discharge suitable for beneficial reuse.

Led by growth in the low pressure membrane segment, membrane wastewater treatment technology markets rebounded strongly in 2010 and 2011, following the global economic turndown. By the close of 2012, global membrane wastewater treatment technology markets are expected to reach \$817 million, equivalent to a 2007 to 2012 CAGR of 13%. With the ongoing economic recovery, demand for membrane wastewater treatment technologies is anticipated to continue to expand, with global markets reaching almost \$3 billion by 2021, equivalent to a 2012 to 2021 CAGR of 16%. At that time, low pressure membrane technologies will maintain the larger market share, but high pressure technologies will achieve higher percentage growth rates.

The market expansion projected for membrane wastewater treatment technologies is rooted in industrial productivity and development and expansion of municipal and packaged wastewater treatment systems. Key regional considerations include trends in upgrading of existing facilities, demand for new facilities, shifts towards higher wastewater control standards in Asia and especially in China, and control and removal

of emerging pollutants such as pharmaceuticals. As technology cost and operation period energy requirements for membrane technologies continue to decline, membrane wastewater treatment technologies are expected to find application across a broadening range of industrial and municipal installation, including strong increases in wastewater recycling, as well as increased and enhanced industrial process water reuse and recycling for non-industrial uses. Demand for reclamation is particularly strong in arid regions where limited water supply is available. In these instances, treating wastewater for reuse is often preferable to desalination or long range procurement fresh water from geographically distant sources.

Membrane Wastewater Treatment Technologies, Global Markets contains comprehensive data on the worldwide market for membrane wastewater treatment technologies (microfiltration, ultrafiltration, nanofiltration, and reverse osmosis), including historic (2007-2011) and forecast (2012-2021) market size data in terms of the dollar value of product shipments. The report identifies key trends affecting the marketplace, along with trends driving growth, and central challenges to further market development. The report also profiles key leading startups and established manufacturers of membrane wastewater treatment technologies that are most relevant to the wastewater industry.

### Report Methodology

The information in Membrane Wastewater Treatment Technologies, Global Markets is based on data from the U.S. Department of Commerce, other U.S. executive agencies, the U.S. Census Bureau, the U.S. Environmental Protection Agency, U.S. national laboratories, the Chinese National Bureau of Statistics, the Australian and New Zealand Environment and Conservation Council, Environment Canada, Eurostat, U.S. and global energy research institutions, the European Commission, the United Nations, various trade associations, business and academic journals, company literature and websites, Securities and Exchange Commission reportings, research services such as Simmons Market Research Bureau, and direct interviews with industry insiders and governmental specialists in the membrane wastewater treatment market.

What You'll Get in This Report [to be updated as report nears completion] Membrane Wastewater Treatment Technologies, Global Markets makes important predictions and recommendations regarding the near and mid-term future of this market. It pinpoints methods that current and prospective industry players can capitalize on existing trends, spearhead new trends, and identify and expand into niche and specialty markets. No other market research report provides both comprehensive analysis and extensive,

quality data that Membrane Wastewater Treatment Technologies, Global Markets offers. Plus, you'll benefit from extensive data, presented in easy-to-read and practical charts, tables and graphs.

### How You'll Benefit from This Report

If your company is already doing business in the membrane wastewater treatment market, in associated manufacturing or service industries, or is considering making the leap, you will find this report invaluable, as it provides a comprehensive package of information and insight not offered in any other single source. Membrane and wastewater treatment technology holders and developers, investors, marketers, midstream industry, and startups will also benefit from key insights into market structure, the supply chain, projects worldwide, and industry suppliers associated with membrane wastewater treatment technologies. The report provides an extensive review of markets for membrane wastewater treatment technologies, from 2007 as well as projections and trends through 2021.

## Contents

### **CHAPTER 1 EXECUTIVE SUMMARY**

SCOPE  
GENERAL BACKGROUND ON MWWT TECHNOLOGIES  
GLOBAL WASTEWATER GENERATION AND TRENDS  
MWWT TECHNOLOGIES  
MWWT GLOBAL MARKETS  
MWWT COST AND PRODUCT TRENDS  
SUPPLY CHAIN  
PRODUCT PROMOTION  
JOB CREATION  
MWWT END USERS  
SUMMARY

### **CHAPTER 2 OVERVIEW OF MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES**

SCOPE  
MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES AND OPERATION  
APPLICATIONS FOR MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES  
Municipal  
Centralized Municipal Facilities  
Decentralized Facilities Including Packaged Systems  
Industrial  
General Characteristics of Industrial Wastewater Treatment  
Key/Primary Applicable Industries  
MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES: SYSTEM DESCRIPTIONS AND REQUIREMENTS  
Microfiltration Membranes  
Ultrafiltration Membranes  
Nanofiltration Membranes  
Reverse Osmosis  
Emerging Technologies  
DEMAND FOR MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES  
History of Membrane Technologies for Wastewater Treatment  
Development of Membrane Wastewater Treatment Projects; Current Institutional and Industry

Demand for Membrane Wastewater Treatment Technologies  
INSTITUTIONAL AND ENVIRONMENTAL BENEFITS OF MEMBRANE  
WASTEWATER TREATMENT TECHNOLOGIES  
Waterborne Pollutant Emissions Reductions  
Water Supply Including Recycled/Reclaimed Water  
Potential for Potable Water Supply  
Other  
COMPARISON TO OTHER/COMPETING TECHNOLOGIES  
SUMMARY

## **CHAPTER 3 MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES – MARKET SIZE AND GROWTH**

SCOPE  
MARKET ASSESSMENT METHODOLOGY  
MARKET ORIGINS, HISTORY, AND PRESENT TRENDS  
Initial Development and Emergence of a Viable Commercial MWWT Market  
Recent Market Strength  
FACTORS AFFECTING MARKET SIZE AND GROWTH  
Technological Developments and Diversification in MWWT Technology Applications  
MWWT Technology Cost  
Role of Recycled Wastewater  
Wastewater Effluent Regulations and Requirements  
Role of Competing Technologies  
Research and Development  
Trends in Global Industrialization and Development  
GLOBAL WASTEWATER PRODUCTION AND TREATMENT  
Review of Global Wastewater Production and Treatment  
Global Wastewater Installed Base  
MARKET FOR MWWT TECHNOLOGIES  
Global Market for MWWT Technologies: Microfiltration  
Global Market for MWWT Technologies: Ultrafiltration  
Global Market for MWWT Technologies: Nanofiltration  
Global Market for MWWT Technologies: Reverse Osmosis  
SUMMARY  
REFERENCES  
SCOPE  
MWWT TECHNOLOGY PRODUCT PRICING  
Microfiltration Pricing

Ultrafiltration Pricing

Nanofiltration Pricing

Reverse Osmosis Pricing

## MWWT PRODUCT AND INDUSTRY TRENDS

Operation Costs

Membrane Bioreactor Operation Cost Considerations

Reverse Osmosis Operation Cost Considerations

Fouling Prevention

Choice of MWWT Versus Conventional Technologies for Wastewater Treatment

## SUMMARY

## **CHAPTER 5 MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES – SUPPLY CHAIN AND PROMOTION**

### SCOPE

#### SUPPLY CHAIN

Supply Chain Structure

Supply Chain Variants and Optimization

Supply Chain Greening

#### PRODUCT PROMOTION

Promotion to the End User

Promotion to Regulators

## SUMMARY

## **CHAPTER 6 MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES – JOB**

### CREATION ESTIMATES

#### SCOPE

#### MODES OF JOB CREATION

#### METHODOLOGY

#### JOB CREATION PROJECTIONS

Microfiltration

Nanofiltration

Reverse Osmosis

## SUMMARY

## **CHAPTER 7 MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES –**

### COMPETITIVE PROFILES

**SCOPE****METHODOLOGY AND SELECTION OF PROFILES****AMIAD WATER SYSTEMS LTD.**

Overview

Performance

Product Portfolio

Company News and Developments

**DEGREMONT TECHNOLOGIES LTD. - AQUASOURCE**

Overview

Performance

Product Portfolio

Company News and Developments

**GE WATER & PROCESS TECHNOLOGIES**

Overview

Performance

Product Portfolio

Company News and Developments

**H2O INNOVATION INC**

Overview

Performance

Product Portfolio

Company News and Developments

**HYDRANAUTICS – NITTO DENKO CORPORATION**

Overview

Performance

Product Portfolio

Company News and Developments

**INGE GMBH**

Overview

Performance

Product Portfolio

Company News and Developments

**KUBOTA**

Overview

Performance

Product Portfolio

Company News and Developments

**OVIVO - GLV INC**

Overview

Performance

Product Portfolio

## PALL CORPORATION

Overview

Performance

Product Portfolio

Company News and Developments

## PENTAIR INC

Overview

Performance

Product Portfolio

Company News and Developments

## SEVERN TRENT SERVICES

Overview

Performance

Product Portfolio

Company News and Developments

## SIEMENS WATER TECHNOLOGIES

Overview

Performance

Product Portfolio

Company News and Developments

## VEOLIA WATER SOLUTIONS & TECHNOLOGIES

Overview

Performance

Product Portfolio

Company News and Developments

## XYLEM INC.

Overview

Performance

Product Portfolio

Company News and Developments

## **CHAPTER 8 MEMBRANE WASTEWATER TREATMENT TECHNOLOGIES: END USERS**

### SCOPE

#### MEMBRANE WASTEWATER TREATMENT TECHNOLOGY END USERS

Moderate to Large Scale Municipal End Users

Small Scale Municipal End Users  
Industrial End Users  
Specialty End Users  
DECISION TO PURCHASE  
SUMMARY

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