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# Membrane Separation Technologies

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Industry Study with Forecasts for **2016 & 2021**

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Study #2872 | March 2012 | \$5100 | 349 pages

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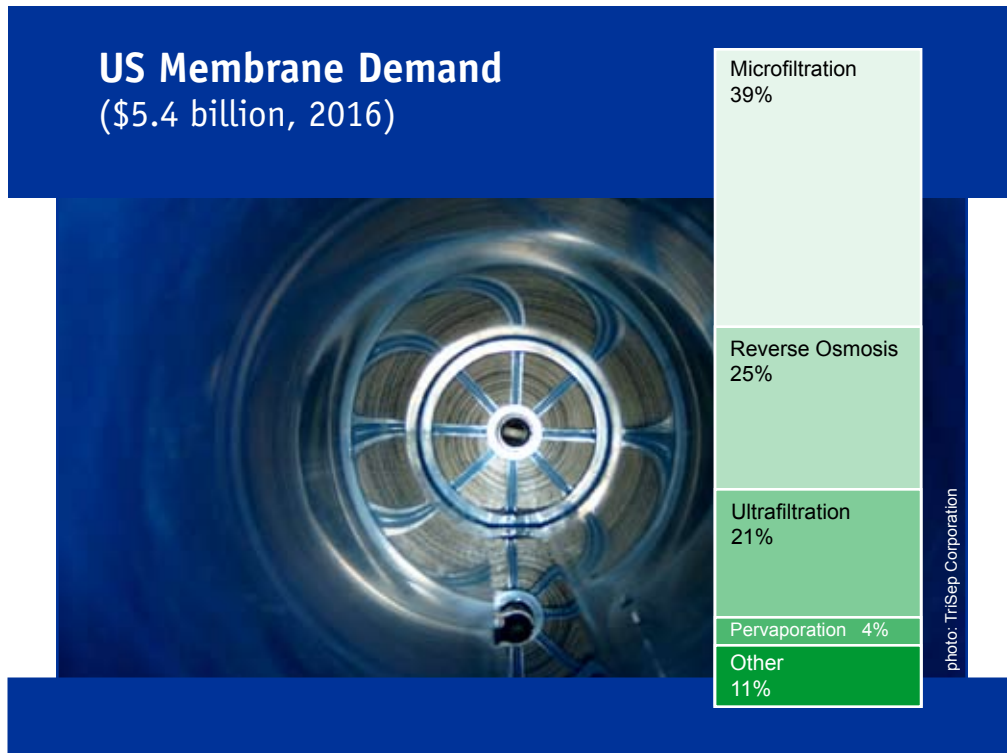
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*US membrane demand will benefit from a need to comply with more stringent environmental regulations, greater manufacturing activity and increasing investment in industrial equipment.*

## US demand to reach \$5.4 billion in 2016

US demand for membranes is expected to increase 7.7 percent per year to \$5.4 billion in 2016. Growth will be driven by the need to comply with environmental regulations regarding water and wastewater streams. Additionally, as production activity and investment in industrial equipment continues to improve, companies will use more membrane separation systems either to replace conventional separation systems or to fill new fluid separation needs. Further gains will stem from a greater adoption of sustainable practices and cost-saving measures that involve using closed-loop water recycling processes to reclaim valuable input materials or process fluids from wastewater for reuse, thereby minimizing costs associated with waste disposal.

Polymeric membrane materials will continue to dominate the market due to their relatively low initial costs and their suitability for use in a range of applications. Fluoropolymers -- which offer a combination of good chemical resistance, high strength, and tolerance of extreme temperature and pH ranges -- and polyamides -- which are relatively low-cost and also tolerate extreme temperature and pH ranges -- each accounted for approximately 30 percent of the polymeric market in 2011. However, polymer-based membranes are subject to competition from nonpolymeric membranes because of the former's tendency toward biological fouling and clogging. Demand for nonpolymeric materials, including ceramics, metals and composites, will



increase due to factors such as better performance in extreme temperatures and greater pH ranges, as well as generally lower maintenance costs.

## Reverse osmosis, ultrafiltration types to rise rapidly

Microfiltration membranes, which represent the most established and mature type of membranes, are projected to continue to account for the largest share of total demand for the immediate future. However, more rapid gains are projected for reverse osmosis and ultrafiltration membranes, both of which produce higher purity streams. These two membrane types will also benefit from their ability to sufficiently treat wastewater for reuse and from increasing interest in

producing potable water from brackish water and seawater. Among the major types, gains are expected to be fastest for pervaporation membranes, albeit from a small base.

## Water & wastewater treatment market to dominate

Water and wastewater treatment will remain the largest membranes market in 2016, representing nearly half of sales. Demand in this market will be driven by the rising use of membranes to produce high purity water or treat low quality water. These trends particularly affect the municipal and industrial segments. However, the best growth opportunities will be in the chemical processing, pharmaceutical and medical markets.

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MARKETS

Membrane Demand: Water & Wastewater Treatment

Consumption of membrane materials in water and wastewater treatment markets is expected to grow at a rate of 10 percent per year to \$1.5 billion in 2016. This rate of growth is expected to be similar to the 10 percent over the gains of the 2006-2011 period, of which 70 percent of the growth in treatment facilities made in the past five years is expected to be due to new technology due to the 2007-2009 recession. Advancements in membrane technology will be primarily supported by the need to comply with environmental regulations that require the use of membrane separation technologies. Gains will also be driven by increased adoption of sustainable practices and cost-saving measures that involve using closed-loop water recycling processes and the reclamation of valuable input materials or process fluids from wastewater that can be reused. Demand will also benefit from the ongoing use of lower quality water supplies, which often contain contaminants best addressed using membrane technologies, in light of regional or seasonal water shortages. The increasing acceptance and penetration of membrane technologies in both water and wastewater treatment applications will also stimulate demand growth. As producers continue to develop membranes that offer greater efficiency and durability, the use of membranes is expected to become increasingly common.

Water treatment accounted for the larger share of membrane demand in this category with 60 percent in 2011. Membranes utilized in water treatment applications also accounted for the largest share of demand in the same year with 29 percent, and will continue to be the largest share through 2016. The water treatment market is also expected to post slightly faster gains through 2016 than the wastewater treatment market. In part, this is because the market for membrane wastewater segment was affected less by the 2007-2009 recession; therefore, the need to comply with environmental regulations; therefore, the rate for this segment through 2016 does not reflect as great a

150

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SAMPLE  
 TEXT

TABLE IV-3

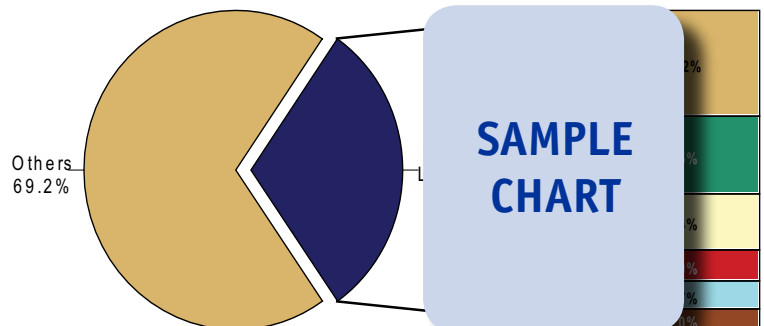
FLUOROPOLYMER MEMBRANE DEMAND BY MARKET  
 (million dollars)

Item	2001	2006	2011	2016	2021
Gross Domestic Product (bil 2005\$)	11,000	13,000	15,000	17,000	19,000
sq ft/mil \$ GDP	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Fluoropolymer Membranes (mil sq ft)	5	10	15	20	25
\$/sq ft	9	10	11	12	13
Fluoropolymer Membranes	5	10	15	20	25
Water & Wastewater Treatment	5	10	15	20	25
Food & Beverage Processing	0	0	0	0	0
Pharmaceuticals & Medical Uses	0	0	0	0	0
Chemical Production	0	0	0	0	0
Industrial Gases	0	0	0	0	0
Other Markets	0	0	0	0	0
% fluoropolymer	1	1	1	1	1
Polymeric Membrane Demand	1571	2250	3185	4045	5050

SAMPLE  
 TABLE

CHART VII-1

US MEMBRANE MARKET SHARE BY COMPANY  
 (\$3.7 billion, 2011)



SAMPLE  
 CHART

**Sample Profile,  
 Table & Forecast**

**TABLE V-3**  
**REVERSE OSMOSIS MEMBRANE DEMAND BY MARKET**  
 (million dollars)

Item	2001	2006	2011	2016	2021
Gross Domestic Product (bil \$)	10				50
\$ membranes/mil \$ GDP					6
Reverse Osmosis Membrane Demand					0
Water & Wastewater Treatment:					0
Water Treatment					8
Wastewater Treatment					2
Food & Beverages:					2
Foods					7
Beverages					5
Pharmaceutical & Medical					4
Chemicals					5
Other Markets					9
% reverse osmosis					4
Membrane Demand	10				90

**SAMPLE  
 PROFILE**

**COMPANY PROFILES**

**Culligan International Company**  
 9399 West Higgins Road  
 Rosemont, IL 60018  
 847-430-2800  
 http://www.culligan.com

Annual Sales: \$1.4 billion  
 Employment: 10,000

Key Products: Reverse osmosis membranes, ultrafiltration membranes, nanofiltration membranes, microfiltration membranes, water treatment systems, wastewater treatment systems, food and beverage processing systems, pharmaceutical and medical systems, chemical processing systems, other markets.

Culligan International Company manufactures membrane separation systems that are primarily used to purify water in residential and commercial applications. The Company is a subsidiary of Clayton, Dubilier & Rice Incorporated (New York, New York), a leading global private equity firm.

The Company is active in the US membrane separation technologies industry primarily through the manufacture and sale of residential and commercial water purification systems based on reverse osmosis (RO) technology. In addition, Culligan designs and produces micro-filtration, ultrafiltration and nanofiltration water treatment systems for commercial and industrial applications.

Residential RO systems from Culligan include the AC-30 GOOD WATER MACHINE drinking water system, which employs a semi-permeable RO membrane to reduce barium, chromium and radium, among other impurities, in water supplies. Culligan's commercial products are available through the CULLIGAN MATRIX SOLUTIONS portfolio, which includes RO water treatment systems for potable water, food and beverages, boiler and deionization system pretreatment, ice production, restaurant and grocery store, water jet cutting, steam production, and humidification applications. Among the RO systems

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“Demand for reverse osmosis membranes is expected to increase 9.0 percent annually to \$1.4 billion in 2016, which is a significantly faster rate of growth than the industry average. Advances will continue to be supported by increasing demand in markets such as drinking water, food and beverage processing, pharmaceuticals, biotechnology, electronics and other industries that employ fluids with the high levels of purity best achieved using reverse osmosis membranes.”  
 --Section V, pg. 112

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**World Plumbing**

Global demand for plumbing fixtures and fittings will rise 6.2 percent yearly through 2016 to \$80 billion. The Asia/Pacific region will lead gains, fueled mainly by China's increasing but slowing rate of industrialization. North America will post the second fastest growth. The residential market will outpace the nonresidential segment. This study analyzes the \$58.8 billion world plumbing product industry, with forecasts for 2016 and 2021 by product, material, market, world region and for 23 countries. The study also evaluates company market share and profiles industry participants.

#2934 ..... September 2012..... \$6100

**World Water Infrastructure Equipment**

World demand for water infrastructure equipment will rise 6.5 percent per year to \$101.7 billion in 2016. In less developed nations, gains will be prompted by expansion of water supply services. In most developed nations, gains will result from upgrades and repairs to aging sewer and water pipe networks. This study analyzes the \$74.2 billion world water supply equipment industry, with forecasts for 2016 and 2021 by product, application, world region and for 22 major countries. The study also evaluates company market share and profiles industry competitors.

#2881 ..... May 2012..... \$6100

**World Activated Carbon**

World demand for activated carbon will rise 10.3 percent annually through 2016 to 1.9 million metric tons. Gains will be driven mainly by more government controls on power plant and factory emissions in the US and China. India will surpass Germany to become the fourth largest market, behind Japan. This study analyzes the 1.2 million metric ton global activated carbon industry, with forecasts for 2016 and 2021 by type, application, market, world region and for 17 countries. The study also evaluates company market share and profiles industry participants.

#2878 ..... April 2012 ..... \$6200

**World Salt**

Global demand for salt will rise 2.9 percent annually through 2015 to 327 million metric tons. Growth in chemical production, especially in China, will fuel most new demand. Demand will also benefit from shale gas drilling in North America, which will boost chloralkali output in the US and Canada. This study analyzes the 284 million metric ton world salt industry, with forecasts for 2015 and 2020 by market, production method, world region and for 20 countries. The study also evaluates company market share and profiles industry competitors.

#2857 ..... February 2012..... \$5900

**World Water Treatment Products**

World demand for water treatment products will rise 6.2 percent annually through 2015. China will remain by far the fastest growing major market. In the US, Japan and Western Europe, gains will favor advanced membrane systems, disinfection and desalination equipment, and industrial wastewater treatment chemicals. This study analyzes the \$48.1 billion world water treatment product industry, with forecasts for 2015 and 2020 by product, market, world region and for 30 countries. The study also evaluates company market share and profiles industry players.

#2802 ..... September 2011..... \$6400

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