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# Reverse Osmosis Systems: Transforming Regional Opportunities

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# Reverse Osmosis Systems: Transforming Regional Opportunities

**T**he earth's freshwater supply is fixed, while global water demand is growing. Increasing industrialization and rising urbanization have resulted in an unprecedented shortage of usable and/or potable water on a global scale. In recent years, reverse osmosis (RO) systems, an increasingly popular membrane-based filtration process, has emerged as an effective solution to transform saline, brackish, and contaminated water into a useable product. In 2014, the global market for RO membranes and system components reached nearly USD5.4 billion and is forecast to grow at a compound annual growth rate (CAGR) of 10.5 percent over the following five years. By 2019, this fragmented and fiercely competitive market is projected to reach USD8.8 billion, primarily driven by municipal water desalination applications, but also by process water treatment for pharmaceuticals, power plants, and micro-electronics, and water reuse.

## Market drivers

More than 50 percent of the world's population is without adequate supplies of potable water resources due to increasing population, drought conditions, increasing per-capita water demand, and increasing industrial, commercial and/or tourist activity. The falling costs of RO over the past two decades have made the process competitive with more conventional water supply options. Factors contributing to price decreases include greater competition among equipment suppliers, improved productivity, reduced costs for membrane modules, improved energy recovery devices that cut plant energy requirements, and the global trend toward the privatization of water projects. The deteriorating quality of water resources combined with increased regulatory requirements forces water suppliers to seek processes that ensure a safe, high-quality product is delivered to customers. However, while the cost of RO has dropped dramatically across all segments, it may still be the most expensive water supply option in most world regions.

## Regional markets

Over the last five years, the Asia-Pacific region has overtaken the U.S. as the global leader in expenditures for RO equipment, a development attributed in large part to rapid industrialization in the region and a rebound of the semiconductor sector. In the arid Middle East, the desalination of water has become essential to meeting the needs of its affluent population and water-intensive industries, especially oil and power. Relative to thermal desalination

methods used widely in the Middle East, the energy costs of RO have dropped increasing RO market share in regions not formerly served by the membrane process. In 1990, 60 percent of global desalination capacity used thermal processes. In 2014, approximately 60 percent of capacity was based on RO.

Most African nations have little RO capacity, although Ghana, Morocco, Angola, and Tunisia and some other countries have installed desalination systems. However, with rising economies in much of Africa, the region's market share is expected to increase. Since the 1990s, water equipment suppliers increasingly have been purchased by total solution providers offering treatment products and technologies, process engineering, operating expertise and training, and sometimes financing for water projects. Ongoing consolidation has turned remaining public water treatment companies into acquisition targets. The

*“... RO [...] may still be the most expensive water supply option in most world regions”*

largest vendors of RO membranes and equipment, including French-based **Suez Lyonnaise des Eaux** and US firms **Evoqua** and **General Electric**, have enhanced their global standings through mergers, acquisitions and product development. Major water/wastewater treatment companies include **Aquatech**, **AES**, and **Best Water Technology**. Another group of firms, such as **Pall** and **Meissner**,



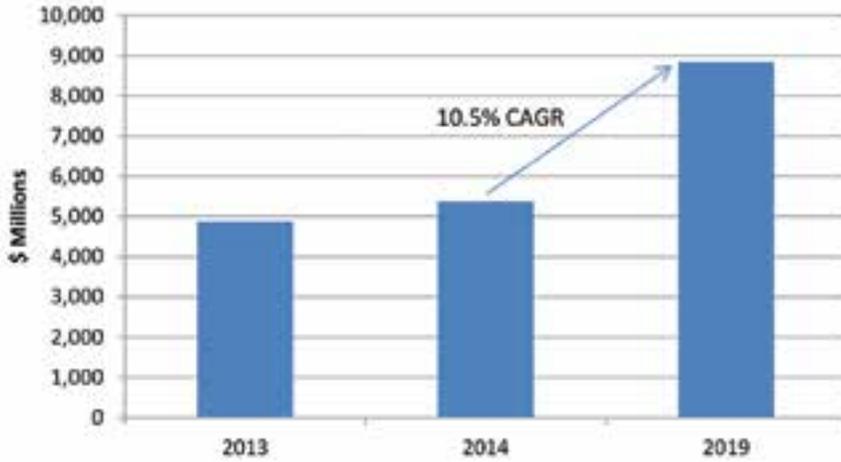
Cover Photo Courtesy of APATEQ

are manufacturers of membranes, depth filters, and related equipment for numerous filtration processes.

## Trends & developments

In the last decade, the water industry has been implementing more “whole-system engineering” for industrial and municipal uses. For instance, large international corporations with multiple proficiencies or a consortium of private companies with specialized skills (engineering, construction, finance) might design, build, finance, and operate a RO desalination facility. Additionally, as the cost of clean water increases along with disposal costs for wastewater, there will be more closing of the loop via on-site recycling and system-wide water reclamation.

## Global value of RO system components for water treatment



In another trend, users are moving away from independent components and construction to integrated, automated systems. Going forward, it is expected that there will be assemblers and suppliers, and site jobs will be specific to the local conditions. Greater competition among RO component suppliers, reduced costs for membrane modules, improved energy recovery devices, and the trend toward privatization of water projects will drive steady growth in this market over the next five years. ■

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يتزايد الطلب العالمي على المياه في حين تبقى إمدادات المياه العذبة على سطح الأرض ثابتة. وقد أدى تزايد حركة التصنيع وارتفاع التحضر إلى حدوث نقص لم يسبق له مثيل في المياه الصالحة للاستخدام أو للشرب على نطاق عالمي. وبرزت في السنوات الأخيرة أنظمة التناضح العكسي كحل فعال لتحويل المياه المالحة والمياه الملوثة إلى منتج قابل للاستعمال. وقد بلغت قيمة السوق العالمية لأغشية التناضح العكسي في العام ٢٠١٤ حوالي ٥,٤ مليار دولار أمريكي مع توقعات بأن تنمو بمعدل نمو سنوي مركب يبلغ ١٠,٥ في المئة في السنوات الخمس المقبلة. ومن المتوقع أن تسجل هذه السوق المجزأة ٨,٨ مليار دولار أمريكي بحلول العام ٢٠١٩. أما سبب هذا النمو فيعود في المقام الأول إلى تطبيقات تحلية مياه البلدية بالإضافة إلى عملية معالجة المياه للأدوية ومحطات الطاقة والإلكترونيات الدقيقة وإعادة استخدام المياه. وأصبحت تحلية المياه ضرورية في منطقة الشرق الأوسط القاحلة لتلبية احتياجات السكان الأثرياء والصناعات الكثيفة الاستخدام للمياه وخاصة النفط والطاقة.

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## Valves Expert Earns Quality Marks

Since 1966, the Dutch company **Wouter Witzel** has been a well-known international manufacturer and supplier of high quality industrial butterfly valves and actuators. In the water treatment market, the company has access to an elaborate network, including contacts with end users, consultants and contractors and further enlarged by the many international offices of the mother company **AVK Group**.

As a result, the company can closely monitor developments in this market, respond to them, and, most importantly, offer worldwide services. This market requires a specific approach; experienced advisors with knowledge of the many applications and processes, fast and adequate service and, especially, a high degree of reliability of the products and materials used. With almost 50 years of experience Wouter Witzel knows many processes and applications



Water treatment installations

of the water treatment sector. As a result, company valves can be found in installations for the treatment of e.g. drinking water, waste water, industrial process water, but also in pumping installations and water transport piping. Besides functioning as blocking valves, company valves are also used as control valves. The ever increasing complexity of the various water

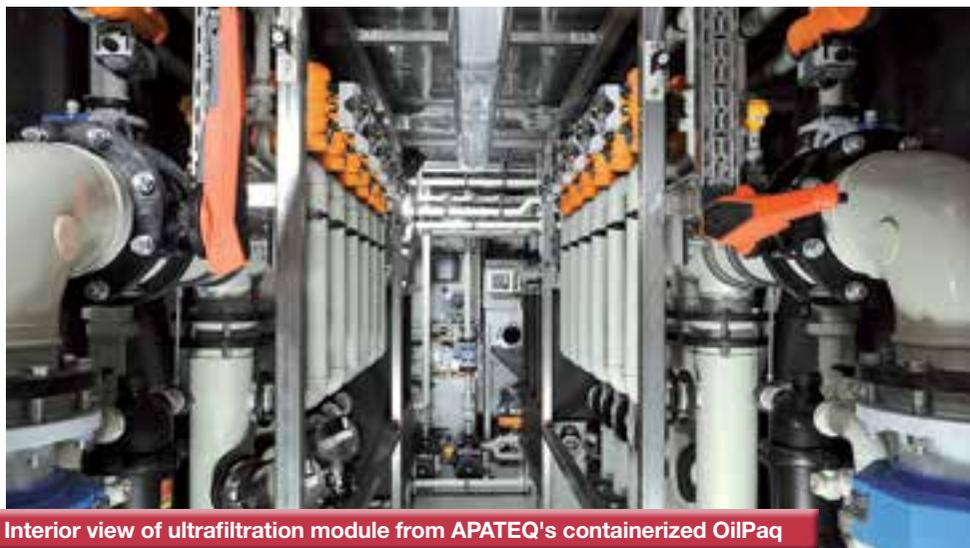
treatment processes also requires products to be even more reliable and durable. From traditional sand filtration to reverse osmosis, disinfection with ozone and water quality improvement by means of e.g. softening - for all these processes the company offers a wide and affordable range of valves. The valves have earned many international quality marks. ■

## APATEQ Sends Industrial Scale Plant to US

Luxembourg based **APATEQ** develops and manufactures highly efficient systems for water and wastewater treatment using proprietary technologies, especially for the oil and gas industry in North America. The special feature of their products is that they, contrary to other market

solutions, do not use chemicals for the treatment process of wastewater. Instead, their systems produce clean water by means of membrane technology at much lower cost than competing products. This feature makes the company's products unique in the world. The company is

currently preparing the shipment of an industrial scale plant in container format for the treatment of fracking flowback and produced water to be operated in the United States. The "OilPaq" recovers oil and generates reusable water while using no chemicals in the treatment process. The fully remote controllable and automated plant abates the need of permanent on-site supervision. Free and emulsifies oil are reduced to levels below 5 ppm (parts per million) whereas TSS levels (total suspended solids) are reduced to below 1 ppm. The OilPaq eliminates bacteria (SRB – sulphur reducing bacteria, and APB – acid reducing bacteria) and the treatment process does not alter the raw water chemistry, meaning that, among others, the TDS level (total dissolved solids) remains unchanged. Operating APATEQ's OilPaq reduces the need for fresh water, disposal costs (very small amounts of sludge vs. large volumes of untreated water), truck traffic and emissions. ■



Interior view of ultrafiltration module from APATEQ's containerized OilPaq