Membrane Filtration

'Tapping' into the residential water treatment market

By Renee Chu

Drinking water quality issues at the residential level are now as sensitive as ever. As the nation's population continues to grow, the associated use of chemical products and waste generation rises accordingly. As a result, an increasing variety of contaminants are regularly released into the nation's water sources, eventually making their way into the drinking water supply. While substances such as arsenic, lead, perchlorate and certain disinfection byproducts such as trihalomethane have been identified to pose adverse impact on human health, the potential effects of many new and emerging contaminants still remain unknown.

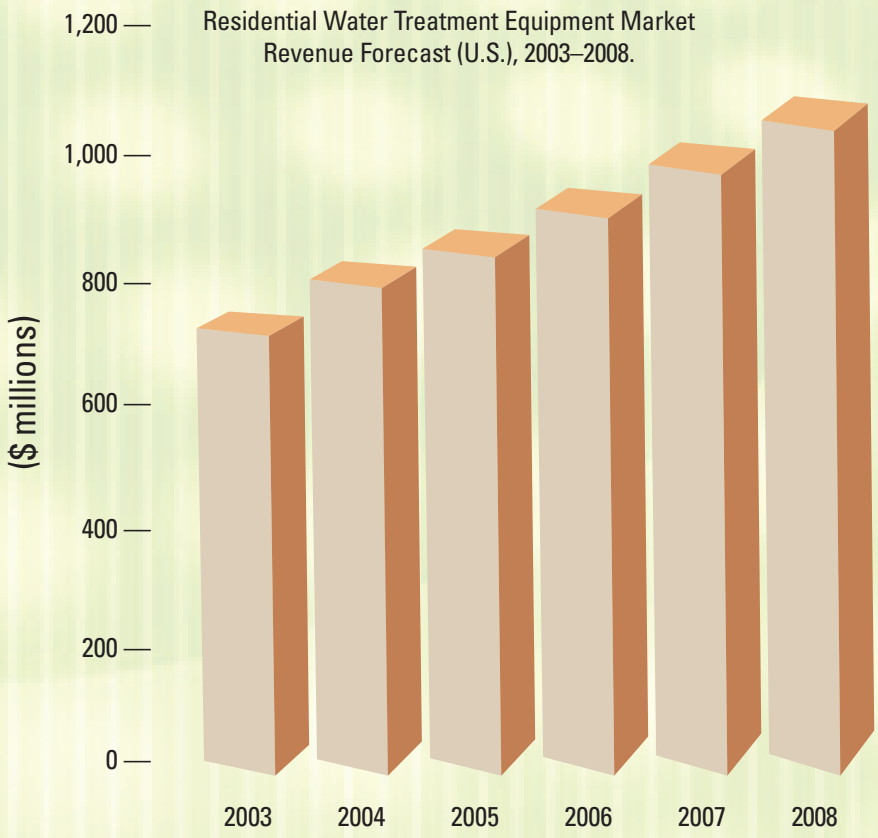
The amendment of the Safe Drinking Water Act in 1996 mandated the U.S. Environmental Protection Agency (EPA) to publish a list of unregulated chemical and microbial contaminants that are known or anticipated to exist in public drinking water sources. After the publication of first such list, also known as the "Drinking Water Contaminant Candidate List," the EPA must prioritize and determine whether to regulate at least five new contaminants on the list every five years.

Residential End Users

Residential end users are as apprehensive as ever about the suitability of tap water for daily potable use. Although drinking water quality is strictly monitored to ensure the required quality standard is met, public concern with contaminant leach from water distribution systems has been progressively heightened. Fearing that drinking water quality may potentially be compromised when it reaches residential end users' homes, many homeowners are taking precautionary measures by treating water supply in the home with either point-of-use (POU) or point-of-entry (POE) water treatment products for added reassurance. This phenomenon is opening up extensive opportunities for the POU/POE water treatment market as well as the bottled water industry.

In the past, limited options were available to residential end users who wished to purchase or install home water purification systems. By and large, the most popular residential water treatment system is POE water softening, which reduces water "hardness" by removing calcium and magnesium minerals. Water softening, however, is ineffective against organic or biological contamination. To ensure household safety, health conscious consumers often turn to bottled water or another POU device, such as water distillers, faucet-mount filters or pitcher filters to "purify" drinking water. Evidently, each of these products has its pros and cons. Distillation, for instance, provides the purest form of water by mimicking Mother Nature's way of water purification through the hydrologic cycle. However, electrical distillation units are energy-intensive and do not provide a continuous supply of treated water. Other devices such as faucet-mount and pitcher filters provide aesthetics remedy by removing residual chlorine.

FIGURE 1:
Residential Water Treatment Equipment Market Revenue Forecast (U.S.), 2003–2008.



Membrane Water Treatment

The market landscape has shifted significantly since the introduction of membrane water treatment products in the home. At present, there are numerous POU and POE water treatment product supplier competing in the residential water treatment market, each trying to gain a foothold in this rapidly expanding market space. Amongst the various residential water treatment products, membrane products are displaying a lot of potential. Figure 1 provides the revenue forecasts of the U.S. residential water treatment market from 2003 to 2008.

In 2004, the U.S. residential water treatment market was estimated at $802 million, and 20% of market share is attributed to residential reverse osmosis systems (RO). RO systems effectively purify water by removing virtually all microorganisms present in water. It is also an effective method of reducing the concentration of total dissolved solids and other impurities such as a variety of ions and metals found in water. Nevertheless, although RO systems are more energy efficient compared to distillation, a typical home system is only designed to achieve 20–30% recovery. Therefore only 2–3 gal. of purified water are produced for every 10 gal. fed into the system.

The introduction of a new generation

residential membrane water treatment product for POE installation has provided the solution for low recovery rates. Instead of filtering water at specific faucets, the POE membrane filtration unit provides the added benefit of filtering incoming water for use throughout the entire household.

The first such product of its kind has recently been introduced into the residential water treatment market by leading membrane supplier Zenon Environmental. Current growth and development in the membrane industry has resulted in drastic enhancement in the economy of scale of manufacturing, therefore enabling the company to apply ultrafiltration technology—traditionally used for municipal and industrial applications—for smaller scale residential use. The most significant benefit of the whole-house ultrafiltration unit is its ability to remove more than 99% of bacteria and viruses that may be present in incoming water. This is a major competitive advantage over traditional media and carbon filters, which are capable of removing unwanted particles such as chlorine and sediments, but not biological contaminants.

Because home filtration provides an additional barrier to ensure drinking water safety for residential end users, recent incidences of microbial outbreaks involving *E.coli* and *Cryptosporidium* have opened up a large potential market for membrane products in the residential space for years to come. With the U.S. residential water treatment equipment market projected to reach more than $1 billion in 2008, membrane-based water treatment products along with other filtration technologies are literally "tapping" the residential water treatment industry through every faucet. *wqp*

About the Author

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