Large MBRs &

By George V. Crawford

How market forces are shaping membrane design and procurement

There are two major changes affecting the membrane bioreactor (MBR) industry: the rapid escalation of the size of MBRs being designed and the emergence of a variety of large corporations offering membrane products. Specific trends can be expected in terms of large-plant design implications and developments, and in MBR products marketing, sales and procurement. When competitors arrive, procurement also changes.

New technology often has a "big dog" that introduces the technology to the market. The big dog builds and maintains the market, including unwritten guarantees; establishes a dominant reputation before other vendors enter the market; and usually is large, friendly, energetic and eager to please. Experience has shown that frequently the big dog creates a market that becomes competitive—a trend the wastewater market is experiencing with MBRs.

Managing Risk

When any new technology is introduced into the wastewater market, a natural evolution occurs. Owners increasingly manage their risk by developing more detailed and performance-specific procurement processes. As these procurement processes evolve, the following occurs:

- Competition enters the market;
- Scopes of supply become more purpose-specific (and generally are reduced);
- Performance guarantees become a key area of negotiation; and
- The technology operation and maintenance responsibilities of the owner increase.

Eventually the technology matures and is marketed and sold as more of a commodity item than a unique value-added technology. MBR designs and the procurement of membrane equipment have evolved and matured, and many of the aforementioned trends can be observed in the current market.

Large Corporations

The membrane equipment market is maturing, as evidenced by the emergence of large corporations into the competition. In 2005, membrane equipment vendors were focused on building the overall MBR market and developing their technology advantages. Selection and procurement approaches were significantly value-based, with consideration of both financial and nonfinancial criteria. The more recent movement of large corporations into the MBR market may be driving a change in focus toward profit and growth expectations.

Corporations may rely more on product pricing and risk management strategies to meet corporate objectives, particularly if those objectives include quarterly sales expectations. A major shift eventually will occur when the total market growth rate is less than the sum of the sales expectations of the large corporations. The focus will be on each corporation increasing its market share by taking business away from competitors.

The City of North Las Vegas Water Reclamation Facility, with the largest operating MBR in North America, will provide reclaimed water for use in industrial and recreational applications.

Large Corporations

As the market matures and large corporations enter it, several related changes could occur, such as the development of standardized equipment so that membrane systems are interchangeable by multiple vendors; vendors adopting a bulk commodity sales approach rather than the value-added sales approach; vendors taking increased product performance risk to win market share; and combinations thereof.

Standardized Equipment

The standardization of membrane equipment has been a popular talking point for several years. Essentially, standardization refers to the uniform physical size of cassettes or racks so that membrane tanks can be designed to accommodate equipment from multiple manufacturers.

Standardization could be market-driven or legislated and mandated under standards. The European Union considered the latter approach and financed the Amedeus Project, which included a mandate to identify the need and viability of standardizing MBR membrane equipment. At the outset, many believed it possible to mandate membrane cassette dimensions, to develop standardized test methods and performance ratings, and to adopt standardized terminology and units of expression. The latter objective is moving ahead, as is the development of test methods. Efforts to standardize physical equipment dimensions by regulatory mandate or collaboration have been abandoned.

It should be noted that even if perfect dimensional standardization were to be achieved, membrane quality and performance differences that will distinguish one vendor's equipment from that of another will continue to exist.

Bulk Commodity Sales

One indicator of a trend away from the value-added to the bulk commodity environment could be vendors' inclusion of responsibilities for the owner that may be in the vendor's interest but for which a ready solution is not available. Recent efforts by vendors to include performance tests and requirements within the owner's responsibilities as warranty conditions create a problem for the owner. Examples include time-to-filter requirements or defining fine-screening performance using a sample location that is within the mixed liquor rather than immediately downstream of the fine screens. These types of "owner's responsibilities" cannot be measured prior to the MBR being in operation, so owners essentially are being asked to take on responsibility and risk they cannot measure or control.

These risks formerly were borne by the membrane vendor as part of the value-added approach to the sale of its unique and new technology. As competition increases and price becomes a dominant selection factor, it is understandable that vendors will try to reduce their risk in order to remain price-competitive. In doing so, however, the market evolves from one that is value-based to one that is more contractually specified and price-based, which could be referred to as a bulk commodity sales environment.

Scope of Supply

The membrane system scope of supply is not standardized and varies widely depending on the procurement approach. A typical scope includes the membranes, programmable logic controllers (PLCs), permeate pumps, air and permeate headers and valves, and key instrumentation. Other items such as air-scour blowers, backwash pumps, chemical feed systems and the biological process design sometimes are included.

As value-based procurement gives way to price-based procurement, it is in the owner's best interest that scope allocation shifts to the party who can provide the best value for each scope component. This ultimately will result in a certain degree of unbundling of components from the membrane vendor's scope.

One way to follow the trend in scope allocation is monitoring the "minimum scope of supply" on current projects. It is believed that the minimum membrane equipment scope on any MBR project to date may have occurred in Australia and included little more than the membranes (cassettes and frames), general arrangement design support and control narratives for the plantwide PLC programmer to implement. The success or lessons learned from those experiences could affect scope allocation and the membrane vendor's scope of supply in all markets, including North America.

The Beginnings of a Trend

Market forces and the emergence of large corporations as membrane equipment vendors are changing the way that MBRs are designed and that membrane equipment is procured. These changes can be observed and monitored, and they can be compared with the classical changes and trends that occur as any new technology is introduced into a market.

Based on the trends observed to date, it appears that membrane equipment for MBRs is evolving from a value-added technology product toward a bulk commodity product approach. It cannot be concluded whether this trend is beneficial or detrimental to owners, rather only observed that market forces have created the beginnings of a trend toward a price-driven, contractual-based procurement market for MBR equipment. MT

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