

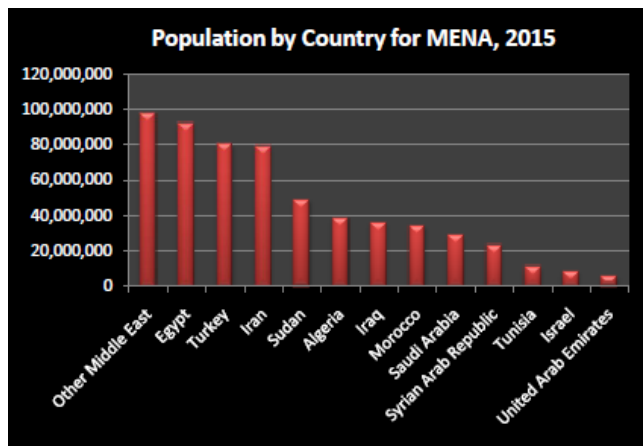
Pumps for Middle East Municipal Wastewater Treatment Plants

By Debbie Fox and Ann James of McIlvaine Company

The pump market for municipal wastewater treatment and reuse in the Middle East and culturally related countries in North Africa (MENA) is predicted to grow from \$420 million in 2010 to \$588 million in 2015. This market is expanding more rapidly than municipal wastewater markets in many other areas for four reasons:

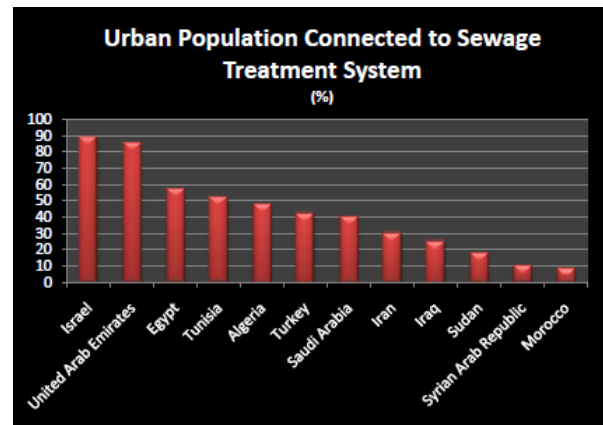
- (1) The countries can afford to improve the standard of living
- (2) Much of the population even in the cities is not yet connected to sewage treatment
- (3) The population is expanding
- (4) Water scarcity is requiring tertiary treatment and reuse of the effluent

Population growth in the Middle East countries plus the development of more manufacturing facilities has greatly increased the need for water. These increases are taking place in a geographic area which is mostly desert and has only one percent of the world's rainfall. Additionally, the distribution of limited rainfall, ground water, and rivers is very uneven. More than 80 percent is completely dry. Population in the Middle East has grown to five percent of the world's population. (see population bar chart) Using existing resources more efficiently is one of the key strategies that these countries are considering employing.



To have enough water, the Middle East countries have built many desalination plants. This process is very expensive, and the governments are interested in reuse of the produced water. Sewage treatment facilities in these countries tend to be old and running at double capacity. For example, the Sharjah MSTP in the UAE was originally designed for a capacity of 80,000 m³/d (21MGD). The actual inflow is around 162,000 m³/d (43MGD). The plant is 100 percent overloaded.

The countries of the MENA have a small number of city residents connected to a municipal waste water plant as you can see in the bar chart. As a result, the cities lose reuse of the water from those not connected to the plant. The need for more plants has been recognized. United Arab Emirates is spending \$15 billion on wastewater treatments plants presently. Sewage treatment in the area may more than double in the next six years. Several high-profile projects have helped create interest in municipal wastewater treatment: Sulaibiya Plant in Kuwait, As Samra Wastewater Treatment Plant in Jordan, and the Ajman Project in the UAE.



Potential opportunities in the municipal wastewater treatment industry are discussed below by country.

Opportunities for Growth

Algeria The Government of Algeria considers wastewater reuse for agricultural irrigation a priority. As part of its second national development plan (2010-2014), Algeria plans to invest \$19 billion for water and wastewater management including 10 WWTP projects. An 80 million GPD WWTP started up in 2008 in Oran with support from the US Trade and Development Agency. Algeria recently awarded a contract estimated at \$86 million to a Korean consortium for another WWTP project.

Egypt Roughly 36% of Egypt's population is connected to sanitation services, 57% in urban areas. Support for the wastewater sector waned in the 1990's due to the burden of accumulated debt. In 2004, the water and wastewater sectors were restructured into four holding companies with the goal of providing service to 100% of the urban population by 2007 and 100% of the rural population by 2022. The holding companies are developing a master plan and have announced public-private partnerships, including an expansion of a Cairo WWTP capacity by at least 130 million GPD.

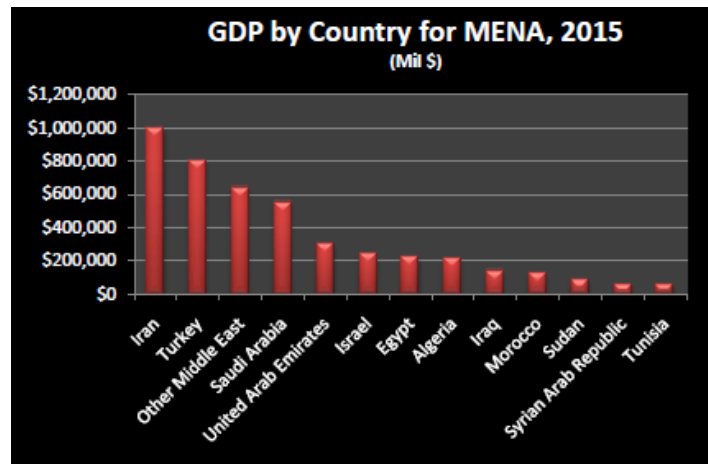
Iran The bulk of collected sewage in Iran is discharged untreated. In an effort to modernize the country, the Ministry of Energy drew up an Outlook Plan in 2003 to increase urban access to wastewater treatment from 30% in 2006 to 60% by 2021, and rural access from 2% in 2006 to 30% by 2021. The fourth Five Year Plan (2005-2009) specified €6.8 billion (\$8.7 billion) for wastewater treatment projects.

Israel Because of limited water resources and extensive irrigation, Israel has become a world leader in the reuse of wastewater for agriculture; 85% of treated sewage is reused. In January 2010, more stringent effluent standards were approved requiring tertiary treatment affecting approximately 260 million GPD of Israel's treatment capacity. About \$200 million will be invested over the next five years to bring WWTPs into compliance with the new standards.

Jordan Due to increases in population and industrial activity, many WWTPs exceed their capacity. Jordan has well developed standards for reusing treated wastewater in the

agricultural sector and plans to increase the amount of reused wastewater to 60 billion gallons/year by 2020. In addition, Jordan projects that the wastewater sector will expand from 25 billion gallons/year in 2008 to 65 billion gallons/year by 2022.

Saudi Arabia Only 40% of Saudi Arabia's population is connected to an integrated sewage and wastewater treatment system. The National Water Company was created in 2008 to accelerate work on sewage systems and improvements. Just two years later, the NWC has taken over 186 wastewater projects and accelerated repairs. NWC will spend \$17 billion in 14 cities that are to have private sector sewage managers in the next five years. It forecasts capital spending on sewage collection and treatment systems will total \$37 billion over the next 20 years.



Syria Untreated domestic and industrial wastewater is typically discharged into surface waters which are used for irrigation. In 2009, the Ministry of Housing and Construction announced a plan to develop Syria's wastewater infrastructure due to concerns over contaminated crops. Officials have indicated that the country will need around 180 new WWTPs. Two initial projects have been announced, to be located in the cities of Jaramana and Swuedah.

Tunisia Approximately 50% of Tunisia's population is connected to a sewage system, with 79% of the collected wastewater receiving treatment. The Tunisian government supports wastewater reclamation and reuse, but this support has not yet led to widespread use. A water reuse strategy was recently drafted and reuse is expected to gain wider acceptance by upgrading the quality of the effluent.

Turkey Turkey's existing wastewater treatment infrastructure reaches just 11% of the population, 85% in Istanbul. Of the treated wastewater, two-thirds receives only primary treatment and is discharged to the sea. In 2006, Turkey adopted a new environmental law aimed at harmonizing its regulations with EU standards and emphasizing the reuse of wastewater for irrigation. Investments for water and wastewater facilities to meet these new standards are expected to reach \$40 billion over the next 20 years.

United Arab Emirates The UAE plans to raise the quality of treated wastewater to make it potable, which means that sewage water would theoretically be fit for drinking. Currently, the UAE uses level three of wastewater treatment. For level four treatment, salinity as well as impurities are reduced to produce higher quality effluent for use in irrigation.

Areas of Uncertain Growth

Iraq Prior to the 1991 Gulf War, Iraq had a relatively high level of sanitation services covering 75% of urban communities, 25% connected to centralized wastewater treatment systems. Currently, only 6% of Iraq's population is served by WWTPs, a majority of which are either not

working or only partially operational. New WWTPs have been built by the US military for their bases. The US Agency for International Development (USAID) is assisting in efforts to improve Iraq's wastewater infrastructure with mixed results.

Palestine (Gaza Strip and West Bank) Only 35% of the population is connected to a sewage system, 65% in urban areas. Most wastewater is either collected in cesspits or only partially treated. The Palestinian Water Authority plans to construct about 25 WWTPs over the next 20 years, although funding is questionable.

Morocco Only 8% of the urban population is connected to treatment utilities, many of which were built in the 1950s and are out of service due to lack of maintenance. Half of urban wastewater is discharged untreated to the Mediterranean or Atlantic, the other half to rivers and wadis.

Sudan Wastewater collection in Sudan serves only 0.6% of the population. Those connected are in the urban part of Khartoum. The majority of urban dwellers are served with pit latrines and septic tanks.

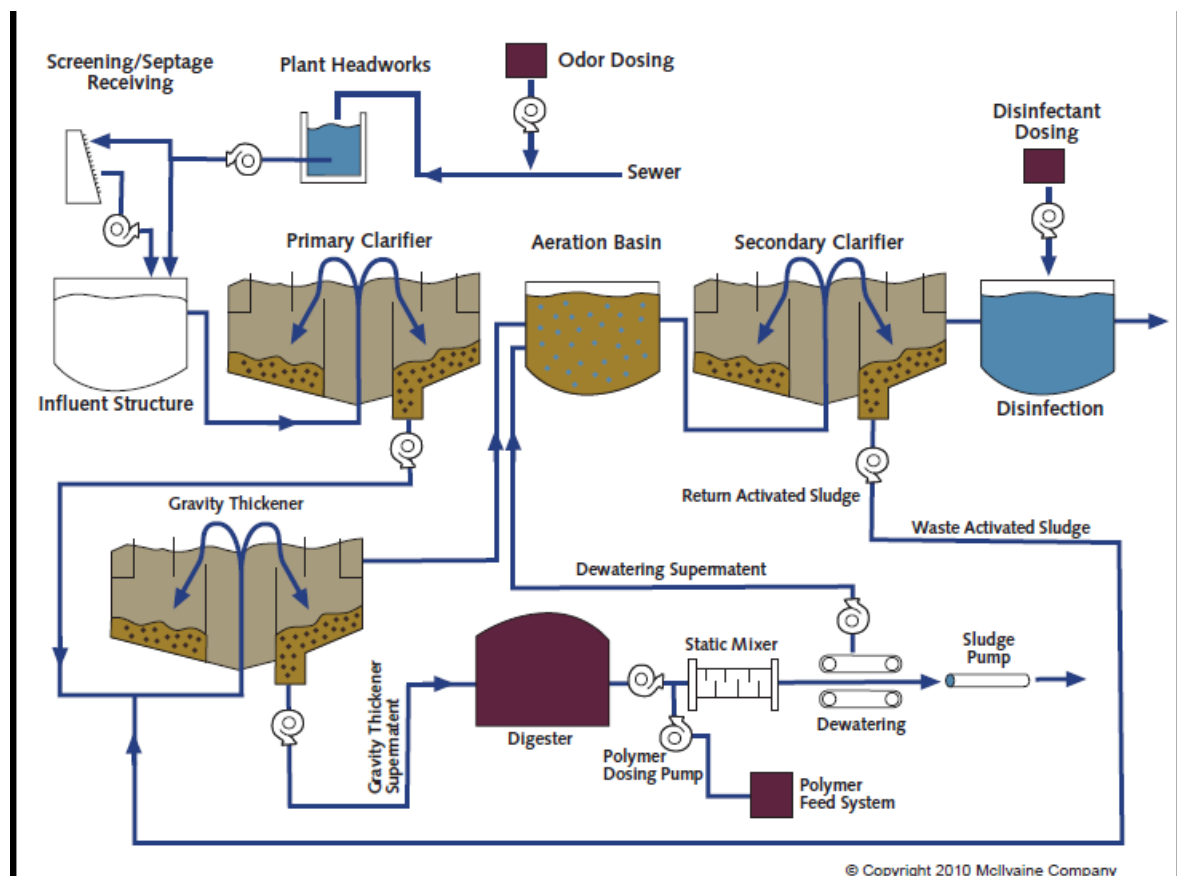
Water Reuse

Water reuse has not been part of the Middle East culture, which is one of the reasons for its slow adoption. Israel and Jordan are the exceptions with large percentages of reuse. Saudi Arabia has an 18% reuse rate. The water reuse market is expected to expand at an annual growth rate of 20 percent. The water is reused in district cooling, irrigation, golf courses, landscape and construction. To encourage water reuse, the Saudis have made changes to its regulatory system to make it more investor friendly. Many sewage treatment plants are now Public, Private Partnership (PPP) or Build, Operate, and Transfer (BOT).

Veolia Water has signed a contract with the public works authority of the city of Doha in Qatar to run the operations and maintenance of two wastewater treatment plants which have full reuse for irrigation and agriculture. The first plant, Doha South STP, has a treatment capacity of 112,000 m³/d of domestic effluents. Constructed in two phases, it has been equipped with an activated sludge plant (surface aerated) then with a Sequenced Batch Reactor (SBR). The second one treats 12 000 m³/d of domestic effluents. It has also been constructed in two phases and is equipped with a Sequenced Batch Reactor plant and, soon, with a sludge treatment facility (digesters/centrifuges).

The A'Seeb wastewater plant in Oman will have sequential batch reactor (SBR) process technology and ultra filter (UF) membrane system. It will have allied infrastructure such as three main pumping stations to convey the wastewater from various A'Seeb collection areas to the plant, storage facilities for treated effluents, two treated effluent pump stations and an integrated control automation system. The effluent will be mainly used for irrigation purposes such as sports facilities and parks through a 43km distribution network being constructed in Al Maabelah and Al Khoudh areas.

Pumps



This expanding municipal wastewater construction creates a market for sewage and other types of pumps. If you look at the diagram above, you will see the many ways pumps are used in a municipal wastewater treatment plant. Pumps are also replacing other types of sludge transfer devices. Robbins and Myers Moyno 2000 HS progressive cavity pump is an alternative to the more expensive piston pump and the higher maintenance open conveyor systems, typically used for dewatered sludge transfer in municipal wastewater treatment systems. Many international pump manufacturers have supplied pumps for plants in the Middle East.

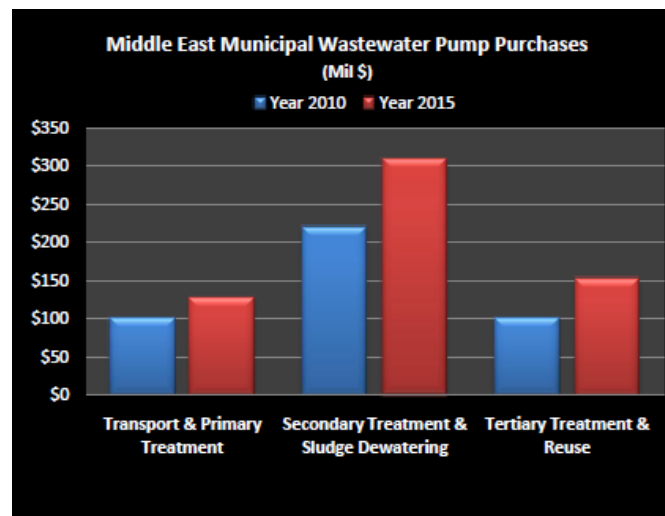
Turkey ABS was chosen as supplier for a wastewater treatment project in Kayseri. The treatment plant has a pre-treatment capacity of 60,000 m³/day which equals up to 1,000,000 people and a bio-chemical treatment capacity of 40,000m³/day. In this region there is an organized industry zone which was built in 1976 and is home to over 600 companies. Some of them are the largest companies in the country.

ABS Turkey sold the customer, Ekosistem and Betas, 18 ABS submersible sewage pumps AFP, twelve ABS flow boosters SB, four ABS submersible mixers RW, two ABS submersible sewage pumps AFP(K) and one ABS submersible wastewater pump AS. The products were delivered in different versions.

Oman ITT Corporation has been awarded a wastewater treatment plant contract in Oman for the city of A'Seeb. ITT was selected by Hyundai Rotem to provide a secondary wastewater treatment solution that includes a sewage treatment plant based on continuous flow Sequencing Batch Reactor (SBR) technology, three main pump stations, two treated effluent pump station facilities, and an integrated control automation system. The plant, which will be Oman's largest in terms of capacity, is designed to reuse the treated wastewater for landscape irrigation purposes or for sea discharge in winter months, if needed. The A'Seeb facility is scheduled to open in March 2011.

Jordan For the recently completed As-Sasmra Wastewater Treatment Plant, the pumps were supplied by the following companies: Eccentric rotor pumps by Allweiler, centrifugal booster pumps by ITT Flygt, and centrifugal pumps by ITT Goulds. This project was the first Public-Private Partnership (PPP) in the Middle East.

Other pump companies involved in wastewater treatment plant pumps include Weir, Flowserve, Moyno, Putzmeister, Gorman-Rupp, Vaughan Chopper Pumps, Grindex, Landia, Monoflo, Cornell, Schwing, Torishima and Ebara. Dosing Pumps are provided by Iwaki, Grundfos, Verder, Lutz-Jesco, Pulsafeeder, Siemens Wallace & Tiernan and ProMinent.



Pump sales are expected to grow in MENA for all treatment phases and reuse handling. The bar chart above shows the trends for 2010 and 2015.

Sales of pumps for municipal wastewater treatment and reuse will increase by 40 percent to \$588 million in 2015 and will double to over \$800 million by 2020. In part this growth will be driven by the increasing industrialization, labor demand and therefore population in the region. The migration of the world's petrochemical industry to the region will be a major cause of the employment increase. The rising wealth and present lack of sewer systems are also factors in the growth predictions.