

water treatment industry:gearing up for global demand

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Abstract

Despite 70 per cent of our planet being covered with water, it is still a dwindling resource. Saline water in seas and oceans makes up about 97 per cent of this amount and only 3 per cent can be counted as fresh water. The total usable freshwater supply for the ecosystems and humans is mere 0.5 per cent of all freshwater resources. The remaining 2.5 per cent is locked up in the Antarctica, the Arctic and glaciers, as ice.

The water requirements of the municipal corporations, industry, and utility and product sectors far exceed current supply.

Many Original Equipment Manufacturers (OEMs) in the water treatment industry are constantly challenged to developing new technologies, business models and engineering processes to fulfill the exponentially growing demand.

New water projects are complex and dynamic because:

1. Water is now a strategic resource. With the world's population expected to rise from 3 billion to 9 billion by 2050 and continuous industrial growth across the globe, water has become a critical global resource.

2. In many developed and developing nations, government-controlled water operations are fragmenting and regrouping under privatization.
3. The adoption of technology is accelerating.
4. International and domestic standards are getting increasingly stringent.
5. Talent acquisition is increasingly global.
6. Engineering a large water project usually involves cross-border cooperation.

This white paper analyses the key components and factors impacting the water industry today. The study of elements like the environment, project execution and government policies among others, is expected to aid decisions on new business plans.

This white paper also discusses a new framework for water treatment and process engineering. Using this framework, OEMs can gain competitive advantage, reduce the overall cost of operations and source fresh talent.

Outlook of the Water Industry

Water resources are finite.

Although water exists in abundance, its unreliable and declining quality is a major issue. Harnessing water suitable for the needs of various industries such as petrochemicals, steel industry, oil and gas, power generation, municipal supply, mining, and chemical and

consumer goods requires an infrastructure that promises a steady supply, efficient equipment, and the reuse of resources. Producing potable water to meet the demands of an increasing urban population is getting increasingly difficult.

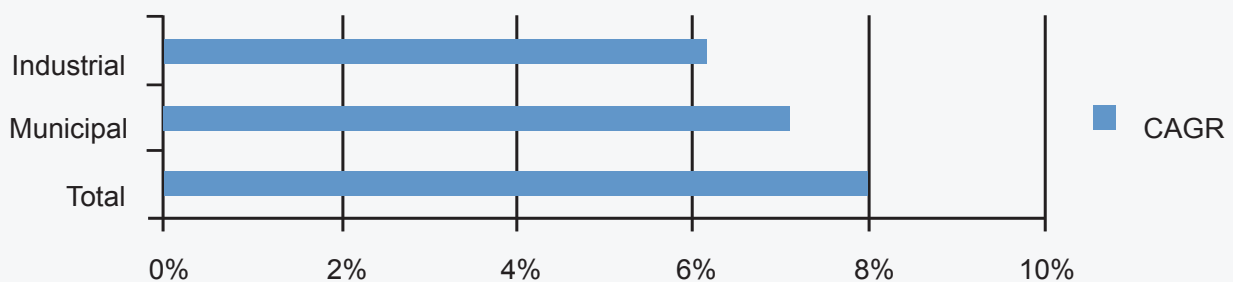


Figure 1: CAGR for demand of potable water

The Impact of Insufficient Water

- Limits the production of oil, power, products and goods
- Limits the consumption of end products and services
- Increases threat of water borne diseases and epidemics due to lack of potable water
- Destroys ecology and ecosystem

'...Polluted water is the planet's deadliest foe, killing 14,000 people a day, according to the World Health Organization. Three problems: a booming population

(closing in on 7 billion worldwide), increased standards of living (which correlate with freshwater use) and damaged groundwater aquifers (which collect and store much of the world's fresh water) - are putting a serious strain on the global water supply. Hence the massive market for water-treatment equipment, which could hit \$1 trillion by 2020.*

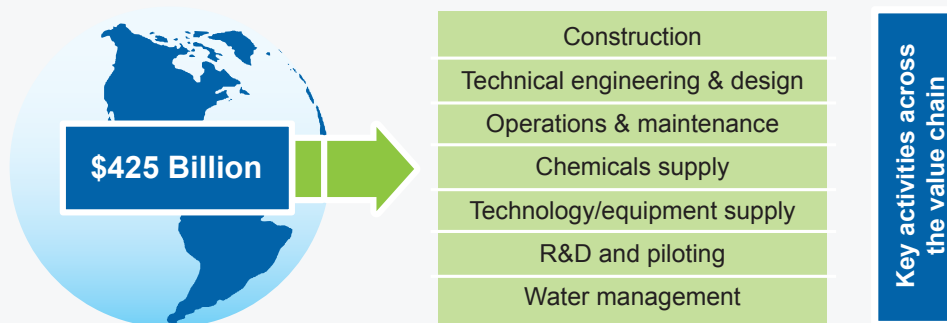
*Source: www.forbes.com

Market Situation

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Source: Frost and Sullivan

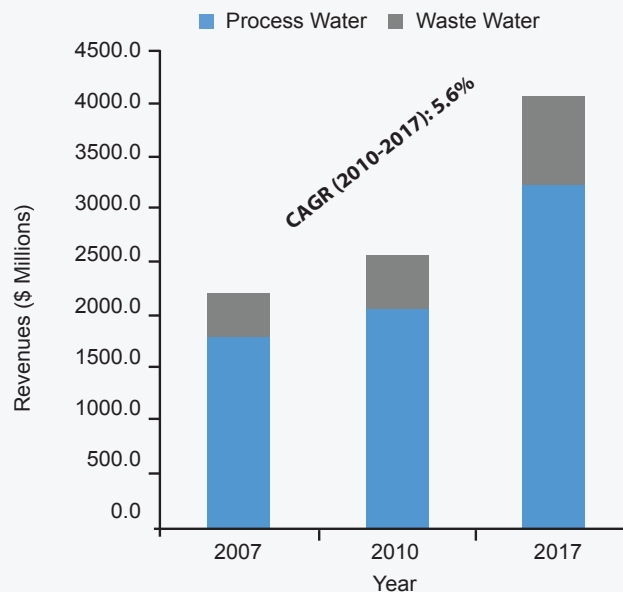
Figure 2: Global Water Market Value

According to a recent report released by Frost and Sullivan, the global water market is worth \$425 billion and divided into two distinct segments. Water and wastewater utilities comprise 58 per cent of the market, while water solutions and services take up the remaining

42 per cent. The manufacturing and power generation industries have unique water requirements, but their biggest risk is the impact of waste discharge on water quality, with consequences for downstream users and aquatic ecosystems.



Figure 3: Global Water Market



Note: All figures are rounded; the base year is 2010. Source: Frost & Sullivan

Figure 4: Global Power Generation water and wastewater Market Revenue Forecast,

The illustration above (Figure 4) indicates steep growth by 2017. of 5.6% CAGR, from \$2080 million to \$3235 million

Growth Drivers

The main growth drivers for the water treatment market are:

- Declining freshwater resources
- Ageing water and wastewater infrastructure in the developed regions
- Rapid increase in population in the developing countries and major urban centers
- Increasingly stringent regulations, particularly in the areas of water reuse and wastage

The Risks

Some of the risks for the water treatment market include:

- Insufficient or unreliable water supply for existing and future operations
- Insufficient capacity to treat and dispose drinking water, waste water, process water and utility water
- Difficulty in securing new permits and legal licenses to operate
- Increased raw and wastewater treatment and disposal costs
- Future liability due to historic disposal practices
- Unhealthy completion due to overcrowding of small and local players in the market
- Economic slowdown

However despite these risks, there is a very bullish outlook on the market due to the strong growth drivers.

Outlook of the Design and Consulting Market

Many technology vendors that provide design and consulting services in the water industry are successfully delivering services to globally dispersed OEMs.

Most of the water industry's equipment and components such as membranes, chemicals, and other parts are developed and produced by a geographically dispersed set of suppliers and vendors.

Pure play engineering service providers, who have integrated design, manufacturing, and part supplying capabilities have shown interest and developed the

infrastructure for designing and manufacturing water treatment equipment.

Their engagement starts from the 'Request for Quotation' evaluation to detailed designing capabilities, such as qualifying the technical specifications of the parts and component suppliers.

The growth rate projected (Figure 6) for the design and consulting market is a CAGR of 8.6% during 2010-2020, a market of over \$180 billion.

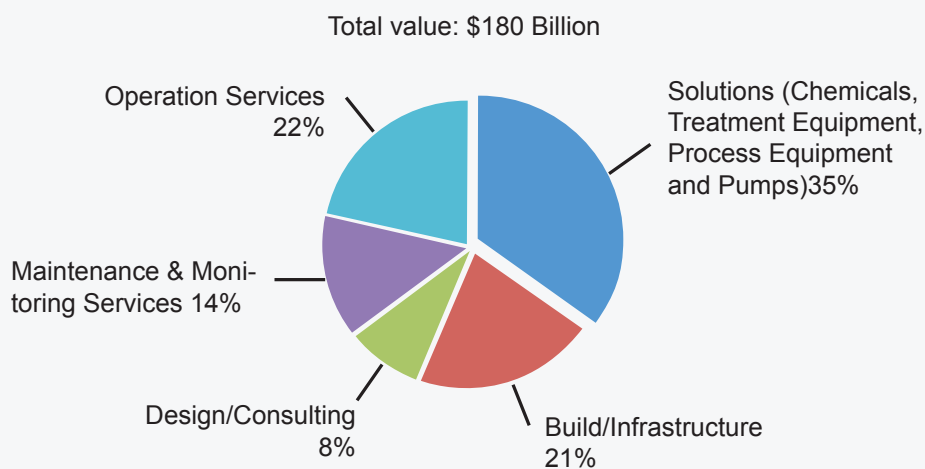
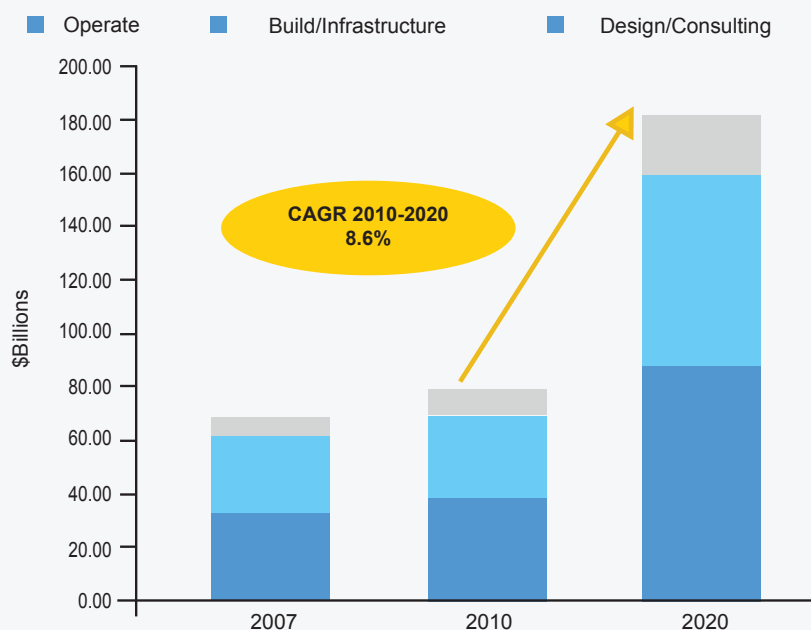


Figure 5: Water and Wastewater Solutions and Services



Source: Frost and Sullivan

Figure 6: CAGR of Design and Consulting Market



Water Treatment Solutions

The use of conventional water and waste water treatment process are increasingly reducing due to diminishing water resources, rapid industrial development and population growth. The requirement for removal of the synthetic organic compounds, nutrients and inorganics from the water due to their potential effect on health and the environment makes the conventional process less efficient.

Producing high-purity water for drinking and industrial water with improvements on quality and cost effectiveness makes the advanced treatment

technologies more demanding and widely accepted.

1. Desalination: To meet the increasing demand for potable water, reverse osmosis based treatment of sea water is one of the most popular technologies used nowadays.

2. Membrane Bioreactor: Membrane bioreactor systems combine ultra-filtration technology with biological treatment for municipal, commercial and industrial wastewater treatment as well as water reuse applications. Membrane bioreactor systems replace

conventional treatment and combine clarification, aeration and filtration into a simple and cost-effective process that reduces capital and operating costs. The result is a consistent, high quality effluent suitable for any discharge or reuse

application.

3. Zero-Liquid Discharge: Zero-Liquid Discharge (ZLD) involves the separation of an aqueous waste to its water and solids components. The water is reused and the solids (usually with some residual moisture) are disposed of as waste. ZLD is highly beneficial to industrial and municipal organizations as well as the environment because it minimizes the volume of wastewater that requires treatment, processes wastewater in an economically feasible manner, and produces a clean stream suitable for reuse elsewhere in the facility.

4. Electro-dialysis/ Electro-deionization Membrane Separation: Electrolytic separation technologies produce high-purity water without handling chemicals or generating hazardous waste.

Need for Outsourcing

To meet the increasing demand and maintain the pace of the rapidly growing market, all the OEMs in the water industry are focusing on core technologies and new products suitable for local market as well as increasing global requirement. While on one hand companies need to be agile and scalable in terms of capacity and capabilities, they also need to cut time and costs when releasing new solutions and products.

Most OEMs have started integrating themselves to multi-location (across the globe) offices cum factories

and remote design centers from a localized design cum manufacturing base. This helps to reduce the project cycle time and build more capacity. All these criteria generate the need for global outsourcing of the complete project lifecycle or a part of it. With that the OEMs can focus on 'core' technologies and outsource the 'detail' engineering and standard manufacturing to its global partners.

QuEST Global as a Technology and Consulting Outsourcing Partner

QuEST Global provides design engineering solutions for water and waste water treatment plants. QuEST Global follows the global model for engineering execution. Its distributed Project Management Systems seamlessly execute and deliver engineering through teams located across the globe. With this, QuEST Global harnesses the unique competencies and advantages of different locations to deliver a high quality engineering design

very quickly. QuEST Global has highly skilled, dedicated and competent professionals (domain experts) on-board. With this resources QuEST Global can offer from design to the building of a full water treatment project. QuEST Global supports complete engineering right from the pre-bid engineering inputs, basic engineering and detail engineering to manufacturing order management.



QuEST Global has the capability to design the product and its complete engineering lifecycle, which includes process engineering, mechanical piping engineering, electrical-instrumentation engineering, control engineering and programmable logic controller (PLC) automation. QuEST Global can thus deliver end-to-end

solutions starting from the development of the piping and instrumentation diagram and layout. It also assists in equipment selection and piping for manufacturing/fabrication, as well as to PLC programming and operation and maintenance manual preparation.

Conclusion

The water treatment and process industry has undergone significant changes in the last few years. However, design and consulting activities have not kept pace with these developments. This gap is widened by factors like business complexity, lack of sector-specific talent and expertise, cost-plus mentality, and other traditional business practices.

The industry faces several challenges in finding expertise, locating niche consulting, engineering the

infrastructure, and various market pressures that need to be bridged in the next few years. The framework discussed in this paper could go a long way in helping the OEMs keep pace with the changing dynamics of the water treatment and processing industry.

OEMs should seriously consider engineering outsourcing to ease the cost pressures and increase participation from the abundant talent and expertise available today from other regions of

Author Profile



Prasenjit Das

Prasenjit Das has over 16 years of experience in process engineering, detail design engineering and Engineering, Procurement and Construction (EPC) project engineering and execution for water/waste water and chemical plant projects.

He holds a Bachelor's degree in Chemical Engineering from Karnataka University, and a Post Graduate Diploma in Environmental Economics and Management from Central University, Hyderabad.

He was a key member in design-engineering for a 35 million litres per day sewage treatment plant White Paper Water Treatment and 5 million litres per day drinking water treatment plant at Terminal-3, Indira Gandhi International Airport in New Delhi and two green-field chemical plant projects in Gujarat. In his two years at QuEST Global so far, he won the "Business Excellence Catalyst" award for his contribution in setting up various processes and a technical road map for the water program.

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About QuEST Global

QuEST Global is a focused global engineering solutions provider with a proven track record of over 17 years serving the product development & production engineering needs of high technology companies. A pioneer in global engineering services, QuEST is a trusted, strategic and long term partner for many Fortune 500 companies in the Aero Engines, Aerospace & Defence, Transportation, Oil & Gas, Power, Healthcare and other high tech industries. The company offers mechanical, electrical, electronics, embedded, engineering software, engineering analytics, manufacturing engineering and supply chain transformative solutions across the complete engineering lifecycle.

QuEST partners with customers to continuously create value through customer-centric culture, continuous improvement mind-set, as well as domain specific engineering capability. Through its local-global model, QuEST provides maximum value engineering interactions locally, along with high quality deliveries at optimal cost from global locations. The company comprises of more than 7,000 passionate engineers of nine different nationalities intent on making a positive impact to the business of world class customers, transforming the way they do engineering.



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