

# Utilities

Middle East

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## INTERVIEW

Dr. Mazen Bachir,  
Managing Director,  
on the company's  
plans for the region

## JORDAN

A waste water  
treatment plant for  
the Irbid region

## CHINA

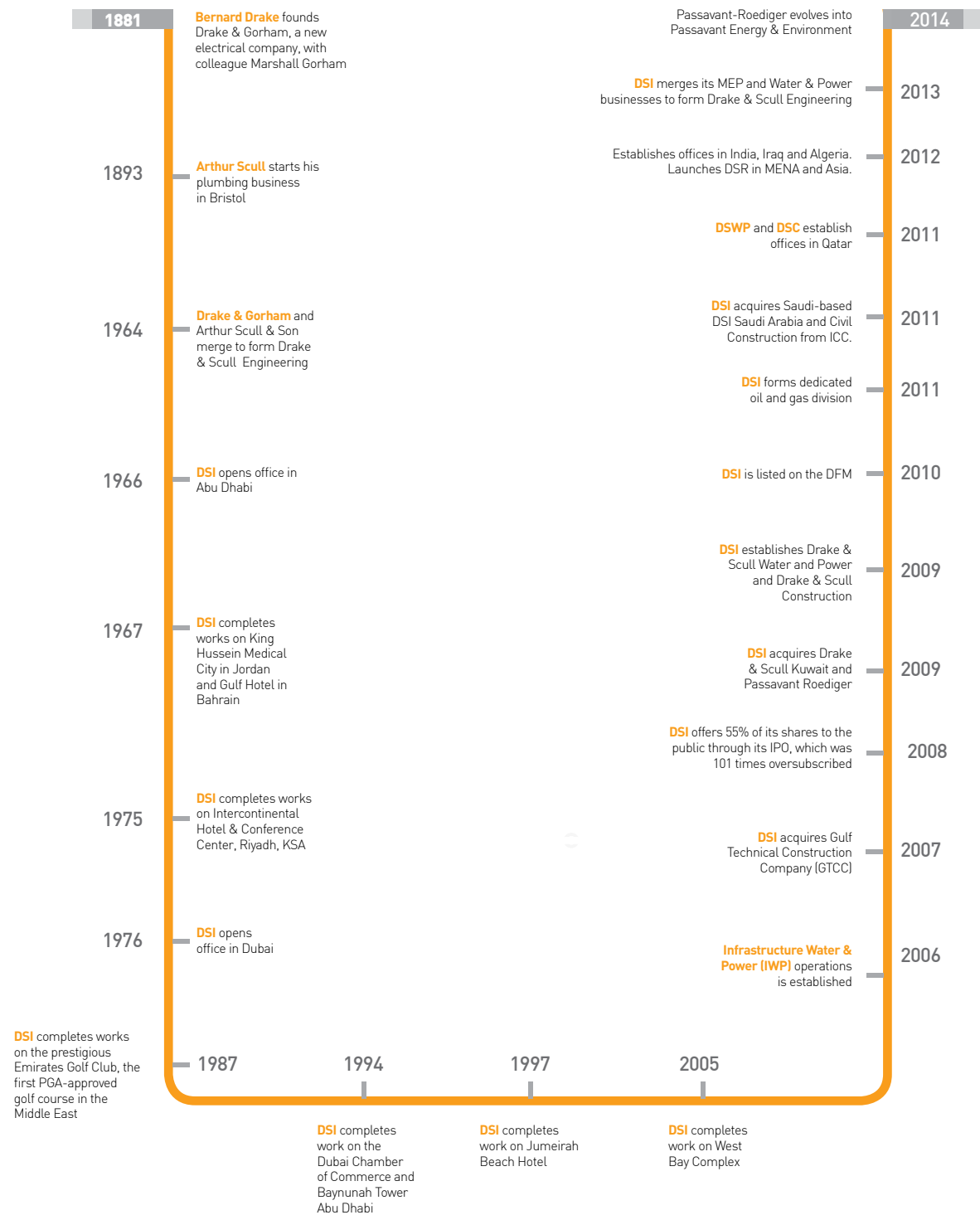
Adding capacity and  
capability at Shanghai  
treatment facility

# PASSAVANT ENERGY & ENVIRONMENT

(Previously known as Passavant-Roediger)

*Water collection, treatment and reuse  
solutions for the Middle East region*

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**PASSAVANT ENERGY & ENVIRONMENT**  
 Passavant Energy & Environment (previously known as Passavant-Roediger) is a leading global specialist engineering, procurement & construction (EPC) provider of turnkey waste water treatment plants, drinking water structures and industrial process water plants. The company's core expertise lies in a highly regarded sludge digestion technology, which has been adopted by hundreds of waste water treatment plants all over the world for more than 150 years.

# WELCOME

The history of Passavant Energy & Environment (previously known as Passavant-Roediger) begins in the year 1842 in Hanau, Germany. Roediger, as it was then known, was focused on the drilling of filter wells, the construction of pumping stations and the installation of pressurised water systems and gas lighting networks. Over the next 150+ years, the company became established worldwide as a specialist in the fields of municipal waste water treatment, sludge digestion and vacuum drainage systems.

In 2009, 82% of Passavant-Roediger GmbH was acquired by the Drake & Scull International PJSC group. In January 2012, the remaining 18% of shares in Passavant-Roediger GmbH was transferred to Drake & Scull International.

In 2014, Passavant-Roediger transformed into Passavant Energy & Environment, with a new focus on energy and eco-friendly engineering solutions. The company shifted its headquarters to Frankfurt and boosted its presence in MENA and Asia.

Today's Passavant Energy & Environment offers an array of solutions and services, which together allows us to provide a design and build service for water, waste water, sludge and waste treatment systems. We introduced the concept of converting waste to energy in the Middle East, by installing the first waste conversion plant in Saida, Lebanon. The company operates globally, throughout Europe, the Middle East, the Far East, North Africa and many other territories.

Drake & Scull's acquisition of Passavant Roediger was particularly well timed, as the Middle East's demand for natural fresh,

clean water resources expanded with the increase in population. The Middle East has around 5% of the world's population, yet receives barely 1% of its natural precipitation. Drawing on groundwater resources at rates beyond natural levels of replenishment is not a viable long term option. Desalination, though a proven technology, consumes large amounts of energy and remains expensive. We need to treat and re-use more of our waste water.

Passavant Energy & Environment has the technology, solutions and services that allow utilities and municipalities to collect, treat and reuse waste water. We are independent in the selection of the best process and equipment for each system, allowing us to provide clients with the most appropriate and cost-effective solution to meet their requirements.

We are completely dedicated to excellence in every aspect of our operations, and have established effective and efficient quality systems conforming to the requirements of the relevant sections of ISO 9001.

Our Quality Assurance Manual is designed to ensure that the relevant requirements for quality are recognised and that consistent and uniform control of these requirements is adequately maintained. All our activities are performed in a planned and systematic manner under procedural control to ensure that all projects are progressively controlled and assured until completion of the work.

Working with Passavant Energy & Environment, clients can be assured that they are working with a reputable provider of proven technologies and solutions. **Utilities**



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# Fit TO REUSE

Dr. Mazen Bachir explains why Passavant Energy & Environment is well positioned to win water treatment and re-use projects in the region

**What are your views on EPC opportunities in the area of water treatment and re-use over the next decade?**

The Middle East is experiencing a surge in its water and renewable energy investment with nearly 100 projects, worth US \$32.7 billion, initiated in 2013 alone. Several regional governments are ramping up efforts to invest more in natural resource capacity as the population of the Middle East is expected to grow by 31% by 2025, reaching 500 million, putting a significant strain on dwindling water resources.

The Middle East is one of the regions in the world where water is very scarce, resulting in significant investment in water infrastructure and non-traditional water technologies such as desalination and waste water re-use – in which the region is emerging as a world leader. So we see tremendous opportunities for EPC specialists in this sector over the next decade.

**Why is waste water treatment of significance in the Middle East, and how is this market segment evolving in this region, particularly in the UAE?**

The region has five percent of the world's population and has less than one percent of the world's available water. Water scarcity is a major threat for food security and political stability in the region. Much of the water crisis is caused by the way water is used. More than 89% of MENA's withdrawn water is allocated to agriculture and only 11% to municipal and industrial uses. According to the World Bank, a reduction in agricultural water use by 15% would double the water available to households

and industry in the region. It's vital that we treat and reuse water, and the UAE has been pro-active in setting up waste water treatment plants. According to the Environment Agency Abu Dhabi (EAD), 60 percent of the 284 million cubic metres of treated sewage generated in the emirate each year is reused. The EAD aims to improve this figure to 100% by 2018.

**What are the challenges facing the Middle East in this area?**

There are two basic requirements. One is the need for comprehensive waste water collection systems, and the other is the need for well-operated waste water treatment facilities.

There is also a third requirement, namely securing users for the treated effluents. Thus, to maximise the contribution of waste water re-use to the total water availability, the generated waste water needs to be collected, treated, and reused.

In the MENA countries, the reclaimed waste water market is unbalanced, with growing supply and stagnant demand. Reducing the gap between supply and demand requires increasing the rate of collection, treatment and re-use to close to the rate of waste water generation.

The MENA countries adopt a supply-driven approach in which finding users for reclaimed waste water often comes after the design and implementation of treatment plants. For example, Tunisia started to explore waste water re-use after it implemented treatment plants along the coast far away from its agricultural lands. We feel MENA countries would be better off adopting a demand-driven approach

when implementing new waste water treatment plants.

**What experience does Passavant Energy & Environment have in providing municipal waste water treatment and industrial projects?**

Passavant Energy & Environment has a long history of developing new technology in the field of effluent and sludge treatment. Passavant has a proven track record of assuming EPC contracting roles on municipal, industrial projects, delivering turnkey, and large-scale treatment plants.

Passavant Energy & Environment solutions have consistently matched the cleanliness targets set out at the design stage, with a zero compromise approach. Passavant offers advanced waste water and sludge treatment technologies with the unique ability to develop custom solutions for every stage of waste water treatment. These include the mechanical, biological and clarification stage, including advanced waste water treatment technologies for re-use applications like irrigation and agriculture.

Passavant Energy & Environment has become a world pioneer in the concept of energy re-use in waste water treatment. Whilst the technology is known in sectors such as seawater desalination, the concept and necessity of energy re-use is a new one in the Middle East, due to the abundance of cheaply available energy. This is what makes Passavant Energy & Environment stand out the most in the field of waste water treatment: namely, the ability to combine treatment with water re-use and now, significantly, energy re-use.



**As an EPC player, how much of your engineering work is carried out in-house?**

Our R&D teams are constantly engaged in researching new breakthroughs and developments to facilitate better water treatment standards. Areas of research include technologies for treatment and re-use of water, such as co-fermentation, as well as anaerobic and membrane technology.

**What is the significance of technology in waste water and sludge treatment, and what is Passavant's specialisation?**

Passavant Energy & Environment is constantly developing and creating its own technologies, which have been field tested extensively and proven to deliver results in different environments around the world.

Two of our vaunted technologies are the 'Sequential Gas Lance Mixing System', which helps prevent the buildup of deposits and brings down operation costs, and the 'Turbo-LME Process', which achieves optimal sludge concentration by thickening the separated floc in a single column.

**What are the key advantages Passavant has when bidding on projects?**

Passavant has been involved in the Middle East for more than a decade now. We've delivered projects in KSA, UAE, Jordan, Algeria and Iraq. Our relationship with our parent company, Drake & Scull International PJSC, gives us a strong regional footprint, stretching from Western Europe to East Asia. Our track record of innova-

tion gives us a headstart over our competition. For instance, we were the first EPC experts to install a waste to energy project in the Middle East, specifically in Saida, Lebanon, and proved that the technology can deliver benefits in this market. Besides converting waste into usable energy, we were also able to achieve zero liquid discharge on the project, which removes the requirement to dispose of toxic waste. Our European engineering teams have in-depth knowledge about the region, and we can also tap into DSI's network of offices, resources and skilled personnel.

**What sort of competition exists in the Middle East, and what gives Passavant the edge in this market?**

The market is competitive, with active participation by leading global players. With the increasing number of projects being announced, there is work for everybody. Passavant's in-house process knowledge, cutting edge technology, skilled engineering, local experience and proven track record across the globe help us position ourselves ahead of our competition.

**Does knowledge of local needs and experience make a difference when it comes to winning projects?**

Having local experience is a tremendous advantage as it lends us credibility in the eyes of the client. Our local operations teams are familiar with the local environment, the local regulations and the local challenges. Language and culture are not a barrier for us as a sizable portion of our workforce hails from the region. We know this market, we know our technology, and we know how to install this technology efficiently and effectively here. Our post-operation maintenance capabilities also add to our value proposition.

**What projects have you been working on in the region?**

We are delivering water and waste water treatment plants in Al Arar (KSA), Kerbala (Iraq), Gabal El Asfer (Egypt), Khalifa City BWRO (UAE) and Heart of Doha BWRO (Qatar), as well as various containerised solution in Iraq, KSA and the UAE. These projects are on track for scheduled completion. We are well established in Europe, and have made inroads in Eastern Europe and Turkey. We are bidding for projects in the UAE and are confident of picking up more projects in the region. [Utilities](#)



## Waste Water Treatment Plant, Shallala, Jordan

Irbid, known in ancient times as Arabella or Arbela, is the capital and largest city of the Irbid Governorate, in Jordan. It also has the second largest metropolitan population in Jordan after Amman, with a population of around 660,000. Irbid is located about 70 km north of Amman on the northern ridge of the Gilead, equidistant from Pella, Beit Ras (Capitolias), and Umm Qais. It has the highest population density in the kingdom, due to its being a major ground transportation hub between Amman, Syria to the north and Mafraq to the east and also for being home to several colleges and universities.

The growth in population had put a strain on Irbid's infrastructure, and the Government of Jordan decided to install a waste water treatment plant (WWTP), to recycle water for irrigation and energy generation. The WWTP was designed to serve a population equivalent of 163,000 with a daily flow of 14,000 m<sup>3</sup> and a peak flow of 1,600 m<sup>3</sup>. The project was flagged off and financed by the German Development Bank (KfW). Passavant Energy & Environment was invited to provide the process design and the electrical and mechanical equipment, while a local part-

ner undertook responsibility for the civil works and the underground piping.

### Scope of work

Passavant Energy & Environment was originally invited to complete the construction and installation of the WWTP in a span of two years. The company was responsible for design and build of the WWTP, effluent pump station, transmission lines to the reservoir and central Irbid WWTP, transmission lines, and sludge dewatering at Wadi Arab WWTP, with 6 months of operation & maintenance. The company did a complete breakdown analysis of the previous design of the WWTP and was able to identify several areas of concern, in keeping with its strong experience of waste water treatment plants all over the world. Passavant Energy & Environment performed a complete redesign of the whole plant and shared its findings with the client, which approved its plans.

The company mobilised nearly 200 personnel, including engineers for design and contract management, site engineers, commercial experts for shipping and purchasing, and civil & installation workers. Passavant Energy & Environ-

ment has been working non-stop on the site since 2009 and has been able to cope with the complete overhaul of the initial design, without significantly affecting the intended launch date.

The company's strong familiarity with the geography of the region, and its expertise with waste water treatment plants across the world have meant that the Shallala WWTP is well on its way to serving the recycling and waste treatment needs of the Irbid region and is a significant achievement for Passavant Energy & Environment in the Middle East.

### Plant features

The WWTP at Shallala is designed to be a biological plant with mechanical pre-treatment, sludge thickening, sludge digestion and sludge dewatering. The treated waste water will be used for irrigation and a combined heating and power plant will use the digester gas for power supply.

Passavant E&E has worked on site to develop the waste water treatment plant in the following stages: mechanical; biological treatment stage; effluent pumping station; sludge treatment plant and biogas utilisation plant. The mechanical stage consists of a coarse screening, stormwa-

ter storage, fine screening plant and aerated grit and grease removal chamber as well as primary sedimentation.

The biological stage includes the biological tank as well as the final sedimentation tanks and the activated sludge pumping station. The purified effluent flows to the effluent pumping station and is then pumped to either the storage tank or to the discharge pressure line.

The sludge treatment employed at the site is Passavant Energy & Environment's patented anaerobic sludge digestion. The surplus activated sludge is thickened mechanically with the aid of polymers. The primary sludge from the primary sedimentation tanks is diverted from the primary sludge storage tank to the digesters. Past this stage, anaerobic stabilised sludge handling is implemented via two digesters, as the digested sludge is displaced into the digested sludge storage tank. The sludge is passed through sludge dewatering machines including a polymer dosing station.

Lime is mixed into the dewatered sludge before it is stored in containers. The filtrate from the mechanical thickening and sludge dewatering units is subsequently flown to the filtrate and centrate pumping station and then pumped to the primary sedimentation tank.

Passavant Energy & Environment installed a gas treatment stage consisting of a gravel filter for coarse gas cleaning, gas torch as security unit, desulphurisers, and pressure-less gas tanks, a ceramic filter as well as a boiler and CHP stations. Beyond this, Passavant Energy & Environment will also erect a bio-filtration unit for odour treatment and a booster pumping station to provide processed water in the screening plants and in the sludge treatment stages. [Utilities](#)

**Waste Water Treatment Plant at Shallala, Jordan**  
**Location:** Greater Irbid / Jordan  
**Start Date:** 2009  
**Industry:** Waste Water and Sludge Treatment  
**Union Railways (North)**  
**Developer:** Water Authority of Jordan of the Ministry of Water and Irrigation  
**Value:** US \$30 million



## Bailonggang Sludge Treatment Plant, China

**CLIENT:** Shanghai Municipal Sewerage Company Ltd.  
**VALUE:** US \$17.5 Million; **PERIOD:** 2010 – 2011

Bailonggang is a busy suburb located on the outskirts of Shanghai, the commercial capital of China. Bailonggang was home to a waste water treatment plant that was struggling to cope with the rapid increase in the city's population. Although the plant design had included a sludge thickening line, there was a need to expand the capabilities and capacity of the plant to better serve the needs of one of Asia's most populous urban agglomerations.

The waste water treatment plant at Bailonggang was funded by the International Bank for Reconstruction and Development (IBRD), and Passavant Energy & Environment was chosen to undertake the contract for the extension of the mechanical sludge thickening plant as well as the construction of the complete sludge digestion and drying plant.

Passavant Energy & Environment assumed complete responsibility for the engineering, delivery and supervision of installation and commissioning of the complete mechanical and electrical sludge treatment plant equipment, which included a full biogas recovery system and a 24 month guidance operation.

To execute the project, Passavant Energy & Environment established a dedicated office in China to handle the co-ordination of local construction personnel. The Bailonggang waste

water plant, uniquely identifiable by the 8 egg-shaped digesters with a total capacity of 99,200 m<sup>3</sup> of sludge treatment, is currently the largest sludge treatment plant in the world.

Passavant Energy & Environment's strong performance on the project led to a string of major project wins in China. Passavant Energy & Environment has now undertaken more than 50 contracts in the world's most populous country, and is well established as a major largescale turnkey contracting company for water, waste water and sludge treatment in China.

Among the other major projects carried out by Passavant Energy & Environment in China are the waste water treatment plant in Beijing (with a daily flow of 600,000 m<sup>3</sup>), the WWTP at Shijiazhuang (with a capacity of 500,000 m<sup>3</sup>/d), Hangzhou (with a capacity of 600,000 m<sup>3</sup>/d), the sludge treatment plant (STP) at Wuhan (with a capacity of 300,000 m<sup>3</sup>/d), and the sludge treatment plant at Yantai (with a capacity of 240,000 m<sup>3</sup>/d).

Passavant Energy & Environment's success in China is proof of the company's strong planning skills, global reach and stellar communication and co-ordination between the local offices and the central office in Germany. The waste plant at Bailonggang is a great example of knowledge and skills transfer in a global economy. [Utilities](#)



● Headquarters ● Subsidiaries ● Branch Offices

# PASSAVANT

## Energy & Environment

**Passavant Energy & Environment GmbH**

Herriot's Herriotstraße 1 60528 Frankfurt

Phone: +49 69 947415-0 Fax: +49 69 947415-111

info@passavant-ee.com

[www.passavant-ee.com](http://www.passavant-ee.com)