



#16

wave

Insights from Veolia Water Technologies



SMART DESALINATION

WATER TECHNOLOGIES





WE ARE RESOURCERS!

At Veolia, our mission is to resource the world by improving access to, preserving and replenishing resources. For our people, this means making a positive impact by seeing the world as it should be, not only as it is.

This mission perfectly applies to SIDEM, a Veolia Water Technologies business unit renowned for its expertise in desalination and its commitment to innovation over many decades.

A CHALLENGING MARKET

But behind this exciting qualifier, the desalination market continues to display significant challenges:

- The full market price of desalinated water in the Middle East, including financing, energy and operation, has never been so low at 0.5 \$/m³ of fresh water;
- The number and size of new desalination projects puts the equipment supply industry under great pressure to deliver within time and budget;
- The competition is as fierce as ever on this market.

In these challenging market conditions, competing actors struggle to save resources necessary for research and development budgets on new technologies.

Despite this difficult environment, Veolia has managed year after year to continue and prepare for the future. To imagine and develop new concepts that will create more value and help our customers to further reduce the cost of desalinated water.

NEW: SAFE, COMPACT, AND DIGITAL DESALINATION

SIDEM is proud to present the Barrel, a new modular technology that combines several innovations to optimize the performance and the operating costs of the Reverse Osmosis (RO) desalination process. With this disruptive technology, SIDEM intends to shake up the industry and reinvent the way desalination is approached.

The revolutionary multi-element vessel reduces capital costs, and its built-in digitalization provides better online control of the conditions of each membrane, thus paving the way to optimized operation costs.

With this new standard technology, SIDEM restates its dedication to pushing innovation in desalination even further. We are Resourcers, for sure, and long-term Resourcers at that!

INSIGHTS

Vincent Baujat

Managing Director, SIDEM
Executive Vice President, Veolia
Water Technologies Middle East



WATER TECHNOLOGIES

Smart desalination

Reverse osmosis is moving towards a world of digitalization and standardization.

Remote monitoring, predictive maintenance and optimization of the production are at the heart of our customers' interests.

We leverage our know-how and long experience in desalination to supply our customers with reliable, modern and efficient desalination plants.

To tackle the challenges of the next generation of desalination plants, we have put ourselves at the forefront of innovation in SWRO by rethinking technologies and developing smart solutions.

www.sidem-desalination.com

Resourcing the world



Veolia Water Technologies specializes in water treatment solutions and provides the complete range of services required to design, deliver, maintain, and upgrade water and wastewater treatment facilities for industrial clients and public authorities.

SIDEM is a Veolia Water Technologies business unit dedicated to large desalination projects, providing expert services in design, engineering, procurement, construction, commissioning, operation, and maintenance.



The Barrel

Seawater desalination represents an everlasting challenge for engineers. The demand for fresh water is growing while its market prices are going down. Meeting the clients' need for lower water costs requires investing in R&D to develop new technologies and smarter solutions.

The Barrel marks the beginning of a new area in desalination



Innovation and technology are part of SIDEM's DNA and that is why we are now paving the way to:

The next generation of RO desalination plants

What should be expected of the next generation of desalination plants?

- **Quality:** Production of the same quality of fresh water than today, but at a lower cost.
- **Safety:** High-pressure systems such as SWRO desalination plants must always be safe.
- **Compact:** It is generally less expensive to install desalination plants along the seashore

where space is often limited. A compact plant also translates to lower CAPEX.

- **Digital:** Information is key and desalination plants must be connected to the best knowledge and expertise: diagnosis, operation recommendations, maintenance strategies and scheduling, etc.

The Barrel: safe, compact & digital

SIDEM's answer to these high expectations is The Barrel

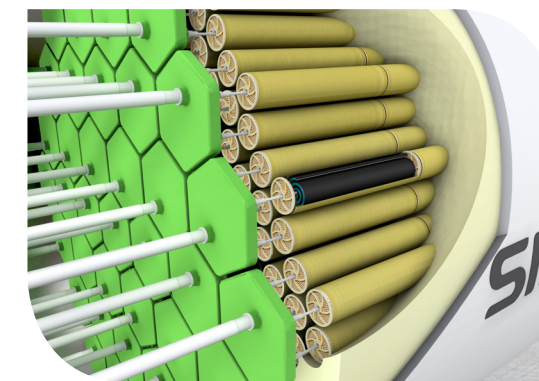
Our engineers have come up with an integrated solution: a multi RO element vessel which allows the RO process implementation to be strictly identical to what we currently have within RO pressure vessels.


The Barrel has a "Plug & Play" approach. The carbon steel pressure vessel is manufactured and tested off-site before being delivered as a single element of the plant. Its installation on site is inspired by large evaporators of thermal desalination plants and secures a fast-track schedule for the whole project.

With its limited number of high-pressure connections, the Barrel is safe. Seawater leakage sources found on the multiple high-pressure connections of traditional RO skids are drastically reduced. Corrosion is therefore less likely to appear on the piping. Maintenance costs of the installation are reduced and the lifetime of the plant is extended.

Being installed outdoor, the Barrel is compact. The fact that no building is required to house the desalination process allows footprint reduction of the RO area up to 25% compared to traditional technology. Besides, the operating temperature of the RO membranes is constantly monitored to ensure that the recommendations of membrane suppliers are met.

Finally, the Barrel is digital. Equipped with a system that enables the remote monitoring of the membranes, it meets the operator's expectations in terms of reliability and continuous OPEX optimization. ■





SMART CONNECTORS

In order to have a permanent vision of the condition of each membrane, smart interconnectors are installed within the permeate tube, next to standard interconnectors, while loading the membranes. These passive devices can communicate with antennas molded in the resin structure and provide the distributed control system (DCS) with local conductivity and temperature. Thus a full mapping of the Barrel's permeate network is available within a few minutes on the DCS.

SIDEM, smart desalination since the 1970s

SIDEM is a Veolia Water Technologies business unit dedicated to large desalination projects, providing expert services in design, engineering, procurement, construction, commissioning, operation and maintenance.

Over
45 years of
innovation

Headquartered in Paris, SIDEM relies on its regional offices in Abu Dhabi, Saudi Arabia and India to provide local commercial support, engineering services and resources in field activities.

A true trailblazer, SIDEM is the oldest desalination company in operation in the world. The foundation of its success and longevity on this highly competitive and technologically challenging market rests on

its agility and its capacity to innovate. These two qualities have allowed SIDEM to better manage the risks inherent to its activities and to build a differentiated offer.

Strength is in the people

SIDEM's structure is optimized around desalination projects and the company has developed a lean answer to market constraints. To ensure the level of responsiveness required, all employees work

in project mode, under expert supervision, favoring an agile management style with short decision-making processes. Working with SIDEM means relying on responsible, committed and performing people, all qualities which have been forged through years of success in often complicated and demanding situations.

A culture of innovation

Research and development is at the heart of the organization. It too is managed in project mode, associating key people, from engineers to purchasing, whose profile or competencies bring value to the project. SIDEM will also look to experts and scientists outside its organization when necessary. MED technology was born from this methodology. The membrane desalination market is an extremely competitive one, where Veolia is bringing innovative solutions in the fields of pretreatment and post-treatment. The strong potential of the reverse osmosis (RO) market and the many large-scale projects in the Gulf, notably, based on this technology, have enticed SIDEM to invest in R&D on this technology as well.

Compact, reliable and competitive plants

Development outlook for SIDEM is essentially in the Middle East (United Arab Emirates, Saudi Arabia, Bahrain, Qatar, Kuwait and Oman), both for membrane and thermal desalination. The company is gearing to answer in the next 3 years to calls for tender on mega desalination projects (from 200,000 m³/d to 1,200,000 m³/d).

Present in the Middle East for over 40 years, SIDEM has proved its competitiveness as well as the performance and longevity of its installations and the quality of its after-sale service. To maintain its success, SIDEM is developing new offers to cater to clients now looking for compact and reliable plants, with less of an environmental impact and able to produce water at a more competitive price point.

To do so, SIDEM is relying on what has always been its strength: cutting-edge R&D, a lean organization, and a unique return of experience from having built and operated so many desalination plants. ■



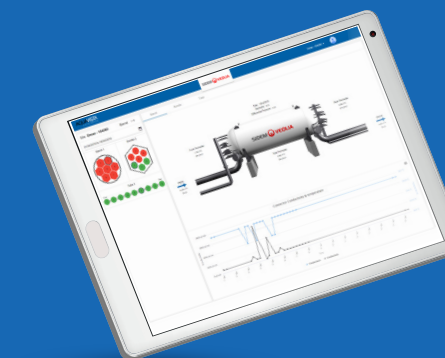
SMART DESALINATION

SIDEM has always looked at the desalination market with an innovative mindset. The digitalisation of the world we live in has inspired us.

We believe that performance, life-time and operating costs of a desalination plant can benefit from digital solutions. By equipping our technologies with sensors, and by connecting these sensors to databases, expert systems and artificial intelligence, we offer our customers a unique opportunity to travel to the heart of their plant. By receiving real-time information on the status of the system,

the operator accesses valuable diagnosis and can thus schedule maintenance phases.

We believe that by being permanently connected to the best knowledge and expertise, the next generation of desalination plants will provide reduction and control of the water cost.



Sadara

A desalination plant for a petrochemical complex



Located 20 km from the Gulf coast in the industrial city of Jubail, Saudi Arabia, the Sadara project is a large-scale petrochemical complex owned by a joint venture of Saudi Aramco and the Dow Chemical Company.

In order to meet the demand for high-quality industrial water of varying degrees of quality, the off-taker, Sadara Chemical Company, receives 148,800 m³/d (nominal capacity) and up to 178,560 m³/d (peak capacity) of desalinated water through a water supply agreement with the owner of the plant, Marafiq, the power and water utility company for the industrial cities of Jubail and Yanbu. The plant is owned and operated by Marafiq on a 20-year build-own-operate (BOO) contract, and the engineering, procurement, construction, and commissioning (EPCC) contract, with 10 years of operation, was

awarded to SIDEM in June 2013. The plant was completed in December 2016.

The Sadara Marafiq desalination plant delivers three different qualities of permeate (for cooling tower make-up, demineralized process water, and utility water) and is designed to deliver a product water capacity ranging from 20 to 100% depending on water demand. The plant has built-in redundancies to reliably maintain maximum production, and has a reduced footprint, thanks to the removal of intermediate tanks between the ultrafiltration pretreatment, the first reverse osmosis (RO) pass, and the second RO pass. Operation is optimized through an automated and remote-controlled system, which is also interfaced with the Sadara complex's integrated fire and gas, process, and communication system.

Plant specifications

As the plant is located inland, it is supplied with seawater through Marafiq's cooling seawater supply network to Jubail. Seawater is drawn from the Arabian Gulf through dredged intake channels, passes through coarse screens and fine screens at the intake pumping station and is chlorinated before it is pumped into an open-air distribution channel and then with an intermediate pumping station located several kilometers away feeding the plant with underground pipes.

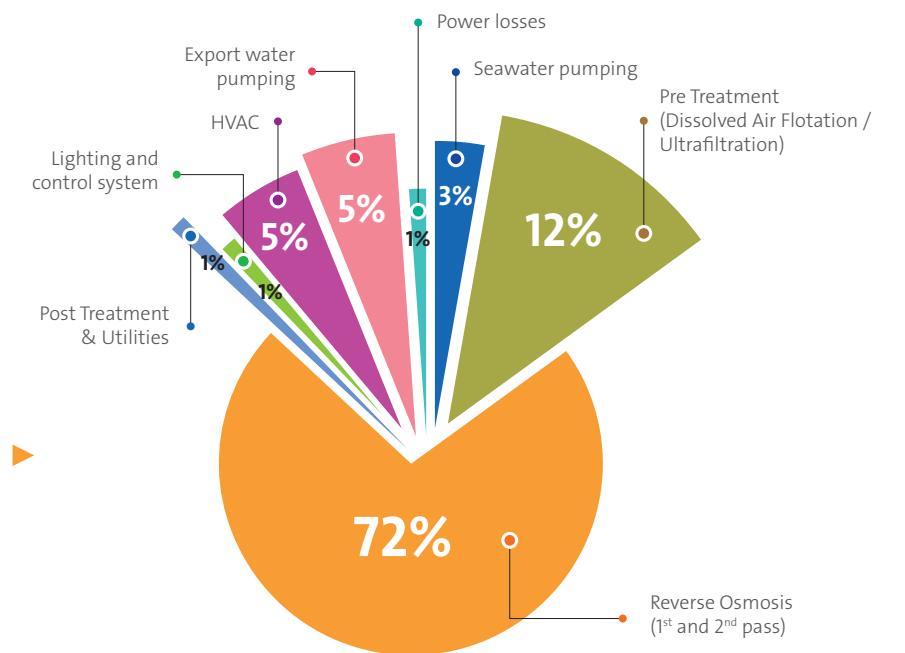
The seawater supply and brine discharge piping infrastructure are both pressurized. Seawater is supplied to the plant with an open-bay pumping station, which feeds the pretreatment. Brine is fed back to the seawater return line by gravity with tall brine break tanks.

Upstream of the RO process, pretreatment consists of Veolia's patented Spidflow[®] Dissolved Air Flotation, self-cleaning strainers, and ultrafiltration. In order to produce the required water qualities in a consistent manner, the plant is made of two passes of reverse osmosis equipped with high-efficiency isobaric pressure exchanger recovery devices, to achieve an energy consumption of around 4.35 kWh/m³. Post-treatment consists of a lime water plant equipped with Veolia's Multiflo[™] saturators, CO₂ dosing, and disinfection by injection of chlorine gas, before storage in tanks dedicated to each product water quality. ■

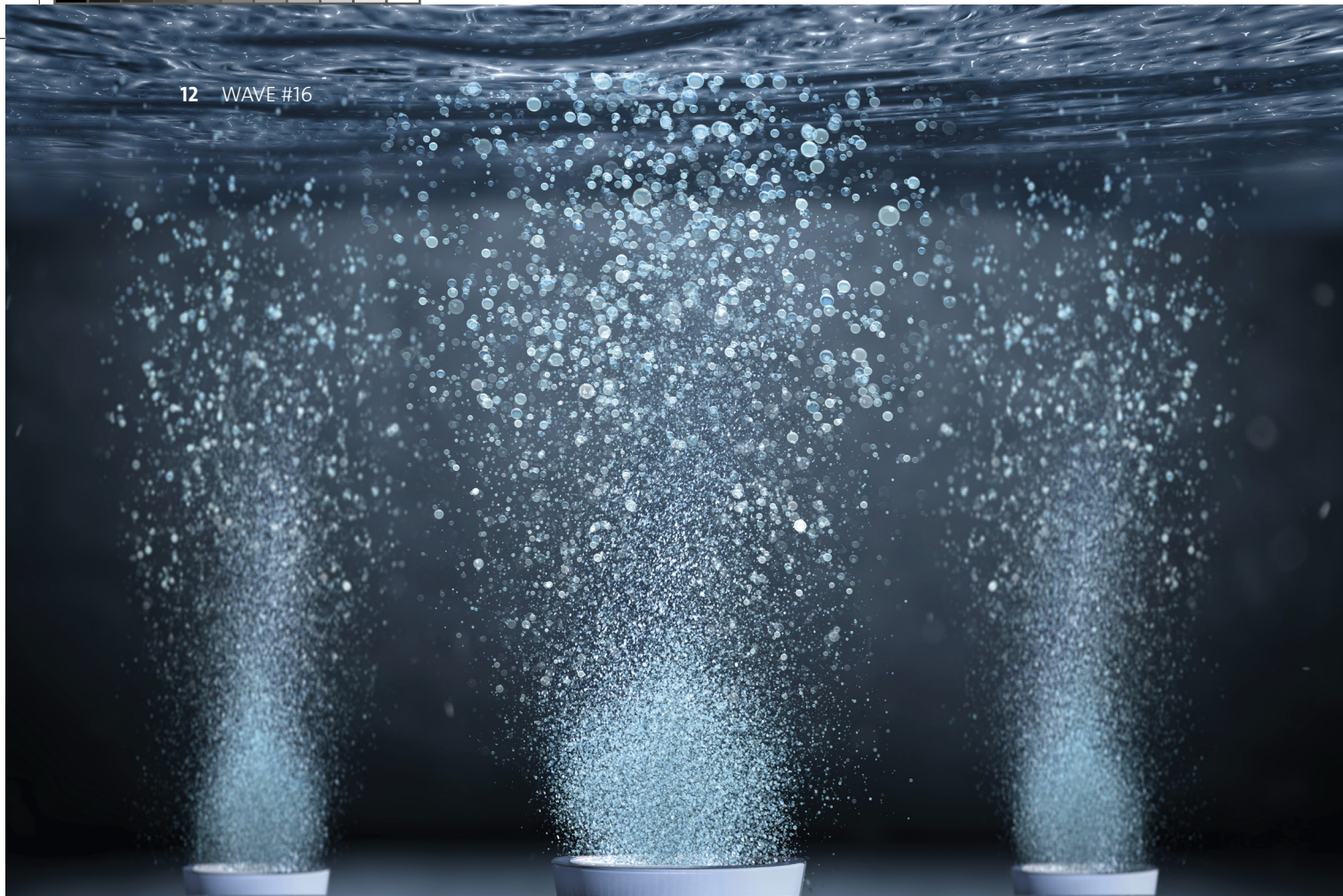
Total capacity	148,800 m ³ /d (Design capacity 178,560 m ³ /d)
Date awarded	2013
Date commissioned	2016
Feedwater TDS	<45,000 mg/L
Product	45% first pass, 90% second pass ~37% total
Product water quality	<40 mg/L (before remineralization)
Feedwater temperature	15-38 °C
RO process description	Two-pass
RO operating pressure	<71 bar
Intake	Marafiq cooling seawater network
Concentrate disposal	Marafiq cooling seawater return network
Number of trains	30 UF, 11 first pass & 5 second pass
Energy consumption	4.35 kWh/m ³
ERD	ERI; Isobaric PX
Membrane supplier	Dow
Pretreatment	Spidflow [®] DAF, strainers, UF
Post-treatment	Multiflo [™] , lime saturator, CO ₂ , Cl ₂ gas
Storage	149,000 m ³ of cooling tower make-up water
Equipment supplier	SIDEM (Veolia)
Procurement model	BOO (20 years) between EPC+10 years O&M contract between Marafiq and Sadara
Offtaker	Sadara Chemical Company (Dow/Aramco)



Product water storage tank for cooling tower make-up water.



Power consumption breakdown at specific load (125,000 m³/d)



The DAF Filter, combining the advantages of flotation & filtration

Improved SWRO membrane protection

Sea Water Reverse Osmosis (SWRO) membranes are highly sensitive and can become fouled if algae, suspended solids, soluble organic molecules and hydrocarbons in feed water are not removed adequately. An effective raw water pretreatment system upstream of an SWRO system is therefore essential to prevent the risk of membrane clogging and to ensure durability of the plant. In order to deal with the most challenging seawater quality (red tide, high levels of nutrients, suspended solids peaks, etc.) and feed SWRO membranes with consistently good quality of seawater, Veolia Water Technologies has developed and patented a DAF Filter, named Spidflow® Filter. ■

This unique and compact solution combines into one structure the advantages of two proven pretreatment processes:

- > high-rate Dissolved Air Flotation
- > high-rate Multimedia Granular Filtration

Masdar City

1st implementation of SIDEM's DAF Filter

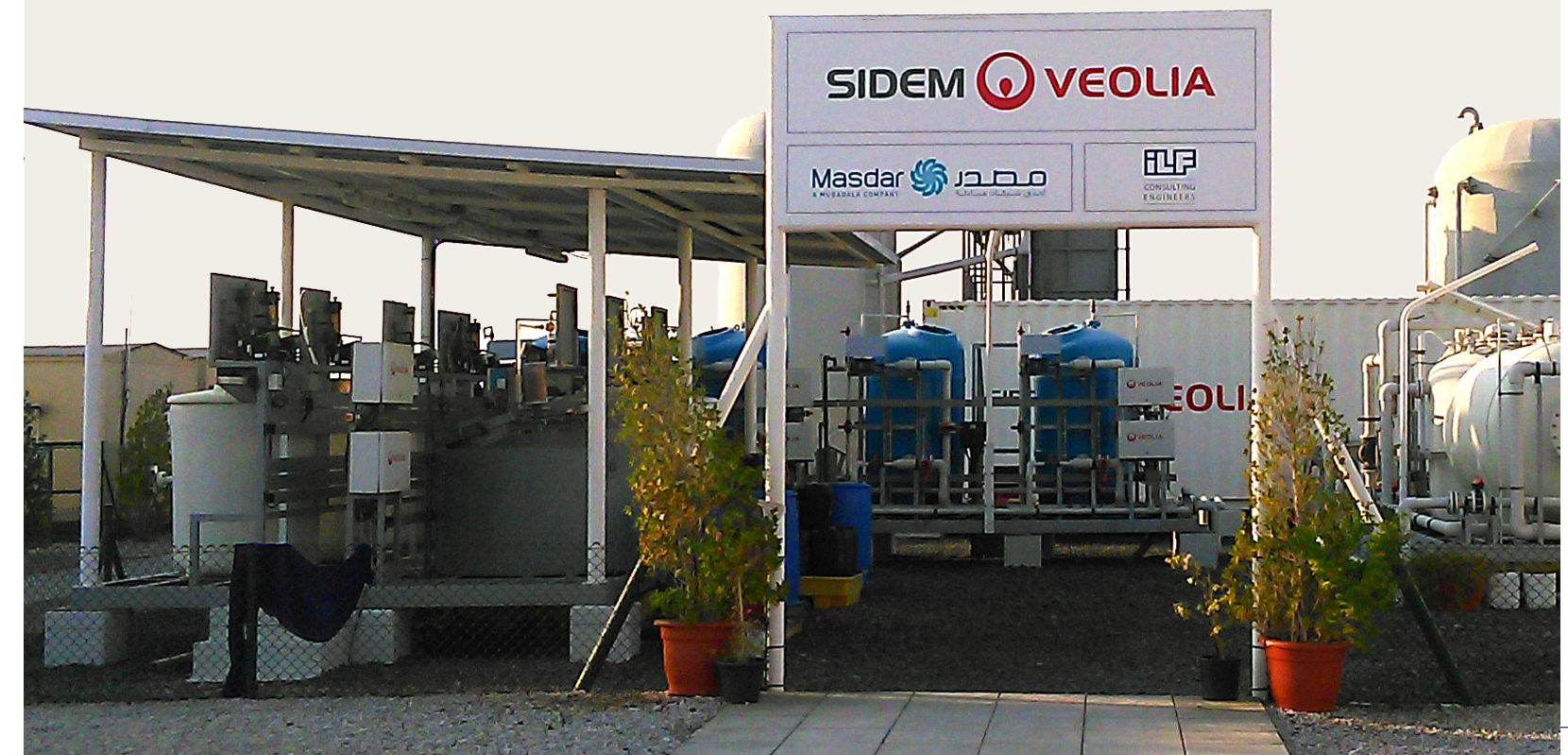


In 2014, SIDEM built and operated one of the five pilot plants involved in Masdar's Renewable Energy Water Desalination Program, aiming to test new efficient seawater desalination technologies.

Operating in challenging seawater quality conditions, the pilot project had to deal with harmful algal blooms, high nutrient levels and suspended solid peaks while maintaining feedwater quality to prevent the risk of membrane clogging and ensure membrane durability.

A key part of the project was the first-ever implementation of SIDEM's DAF Filter. It has a 25% reduced footprint compared to conventional pretreatment, does not require thickening and has a modular design.

Its recovery rate is above 97%. The system also allows biomass development, reducing RO membrane biofouling and enabling low CIP requirements. It reduces chemical consumption and increases membrane life duration compared to UF pretreatment. ■





Az Zour North IWPP Desalination Plant

Supplying fresh water to Kuwait with pride

A series of firsts

As Az-Zour North's Phase 1 project water plant supplier, SIDEM is proud to have been involved in several firsts.

First IWPP in Kuwait: In cooperation with Hyundai Heavy Industries (HHI), SIDEM has built the Az Zour North Phase 1 Independent Water and Power Plant (IWPP) in Kuwait for the benefit of Shamal Az-Zour Al-Oula, the Project Company primarily owned and managed by Engie and Sumitomo Corporation. SIDEM is recognized as the best EPC contractor for large size IWPP, after delivering successful projects such as Ras Laffan C, Marafiq Jubail, Fujairah 2 and Al Hidd.

First MED-TVC technology based desalination plant units in Kuwait: Kuwait was previously relying on old MSF technology for its desalination plants but decision makers made an historical yet logical move given that MED-TVC is currently the most reliable,

efficient and economical thermal desalination technology available.

First MED units in the world with capacity exceeding 10 MIGD: With an individual design capacity of 10.84 Million Imperial Gallon per Day and a successful test capacity of 11.5 MIGD, the Az Zour North Phase 1 MED units are now recognized as being the largest capacity units in operation worldwide. This achievement sets a new industry benchmark and demonstrates SIDEM's unrivalled position as global leader in MED technology.

State of the Art MED-TVC Technology

Benefiting from SIDEM's experience in the design and supply of MED units for over 40 years, the latest Az-Zour North MED plant features SIDEM's largest and most efficient MED-TVC units.

The MED system currently under commercial operation provides a very high efficiency with a design GOR of 11.2 and an actual performance tested GOR of 12.1. Similarly, the system was performance tested at an actual daily production of approximately 11.5 MIGD, compared to the design daily production of 10.84 MIGD. As well, this performance was achieved using a very low steam pressure of 2.7 bar(a) and the MED operation is guaranteed within a wide seawater temperature range (10 to 38°C).

*EPC: Engineering Procurement Construction & Commissioning
MED-TVC: Multi-Effect Distillation - Thermal Vapor Compression
GOR: Gain output ratio
MIGD: Million Imperial Gallon per Day.*



Smart technical solutions for the benefit of the plant owner

Many innovative technical solutions were implemented for Az-Zour North Phase 1 project to minimize investment and operating costs and to increase ease of operation.

- A compact plant arrangement was engineered to minimize footprint, resulting in a total area of less than 80,000 m² in total.
- High thermal efficiency MED units were provided based on SIDEM's in-house knowhow and world-best TVC technology.
- An optimized remineralization plant design was engineered and provided, including high efficiency degassifiers installed downstream of limestone filters to significantly reduce caustic soda consumption.
- Special care was taken for integration of the CO₂ plant in the remineralization process.
- A limestone filter automatic filling system using hydro carriage was engineered to improve operational conditions.
- The limestone filter wash water recovery system saves approximately 5,000 m³ of potable water a day.

Excellence in project delivery

Innovation and "firsts" are not possible if not supported by extremely efficient project management that ultimately allows smooth project execution and on-time

delivery of a performing plant. SIDEM's lean organization at every stage from engineering to procurement, logistics, construction and commissioning was the key to SIDEM successfully achieving this project. Notable achievements include the early delivery to site of 10 fully assembled and tested MED-TVC giant evaporators (2,600 tons each and 54 m long, 33 m wide, 14 m high) and the fast-track commissioning with 10 units started up in less than 5 months.

SIDEM was also able to complete the reliability test flawlessly on the first attempt. ■

Az Zour North Phase 1 IWPP main figures

- 107 MIGD Water Plant output, equivalent to 20% of Kuwait's fresh water production
- 10 MED units, each with individual 10.84 MIGD capacity
- Project executed on time in 35.5 months
- 30,000 km, or 6 times the distance between Paris and Kuwait City, is the total length of MED heat exchanger tubes.



Sur Extension

An addition to the first independent desalination project in Oman

Since September 2016, the city of Sur, located 150 km south-east of Mascate, in the Sultanate of Oman, has increased its production capacity and is now able to supply drinking water to almost 600,000 inhabitants. The Sur Desalination Plant, in service since 2009, has been expanded to reach a total production of 29 MIGD (131,800 m³/day). The expansion project, awarded in 2014 to SIDEM, is an Independent Water Project (IWP) developed on a Build-Own-Operate (BOO) basis by Sharqiyah Desalination Company (SDC) and is located next to the existing reverse osmosis plant. The additional water capacity produced by the expansion project will help in meeting the projected demand for potable water in the Sharqiyah region.

Pretreatment innovation

On the first Sur Desalination Plant, seawater was pumped from beach wells, while the expansion plant draws seawater through a 700-meter pipe equipped with passive screens, cleaned daily with an air blast

system. Pretreatment consists of Veolia's patented Dissolved Air Floatation system, Spidflow®, followed by an innovative combination of dual media pressure filters and cartridge filters. This feature helped in reducing the footprint of the pretreatment.

The DAF units protect the plant from natural algal bloom events, also known as red-tides, therefore guaranteeing maximum plant availability throughout the year. Outside of these exceptional events, they also help the operation of the pressure filters by removing a significant part of suspended solids as concentrated sludge, ready to be dewatered.

Reverse osmosis system

The pretreated seawater is desalinated in a one-pass reverse osmosis stage. The brine's energy is recovered using high-efficiency isobaric pressure exchangers before being blended with the first plant's brine and discharged to the sea. Thanks to a dedicated team of engineers, the performance-oriented design of the plant succeeded in reducing the energy consumption of the expansion plant down to only 3.2 kWh/m³.

The permeate produced is then sent to the existing post-treatment for mixing, remineralization and final disinfection.

MIGD: Million Imperial Gallon per Day
M&C: Media and Cartridge Filters
SWRO: Sea Water Reverse Osmosis
RO: reverse osmosis
CF: Cartridge Filters
DMPF: Dual Media Pressure Filter



M&C filtration: a compact solution for lower footprint SWRO pretreatment

SWRO membranes are highly sensitive to variations in water quality. They require high-quality pretreated water with low solids content. A raw water pretreatment system upstream of an RO unit is essential as it prevents the risk of membrane clogging and ensures its durability.

To successfully deal with poor seawater quality and feed the RO membranes with

consistently good water quality, removing high turbidity and suspended solids particles, Veolia Water Technologies has combined Media filtration and Cartridge filtration technologies in the same pressure vessel.

This unique and compact solution bundles into a single structure the advantages of two proven processes: high-rate pressurized filtration and cartridge filters for fine particulate removal. ■

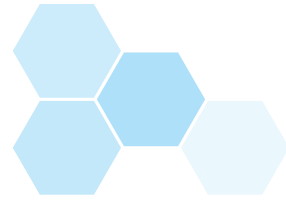
M&C filtration is installed in Oman Sur SWRO Plant Extension.

Advantages of Combined Pressurized Filtration + Cartridge Filters

The combination of these two processes means benefiting from the best features of each, thereby offering:

- Robustness to deal with any water quality and low sensitivity to variations in parameters;
- High removal efficiency of suspended solids, turbidity and SDI15;
- Combination of the best filtration barriers to dissolved organic matter with biomass developing on the media bed, making it an excellent protection system by reducing the risk of membrane biofouling;
- A reduced footprint, due to CF being installed directly in the DMPF vessel, for treatment plants of medium sizes;
- A CAPEX saving for medium-sized SWRO plants by reducing piping, structures and valves as well as civil and installation costs;
- Low OPEX: high water recovery with media filtration with minimum water losses, low chemical requirements, low CF replacement rate and an overall low energy consumption;
- Easy access for maintenance & replacement of cartridge filters, with direct access by the top platform to remove the CF top plate and allow positioning of CF basket inside the vessel.





AQUAVISTA™ Digital Services

AQUAVISTA™ Digital Services is a wide and flexible range of digital solutions that address the challenges faced by industries and municipalities, providing them added-value services.

As part of AQUAVISTA™ suite, AQUAVISTA™ Insight is a data-driven performance optimisation tool.

Indeed, this innovative digital offer unlocks the full value of data, enables faster and more

evidence-based business decision making and delivers a holistic visibility of the operations and processes by providing to end-users different level of analytics - descriptive, predictive and prescriptive - via user-friendly dashboards for better decision made available through global KPIs library.

These high-value analytics are coming from multiple sources of data with different levels of services, as below:



AQUAVISTA™ Insight SMART MEMBRANES

VALUE

- Minimize the downtime
- Optimized planning of membrane's cleaning & replacement
- Anticipate membrane dysfunction
- Assess efficiency of the cleanings
- Energy & chemicals consumption optimization



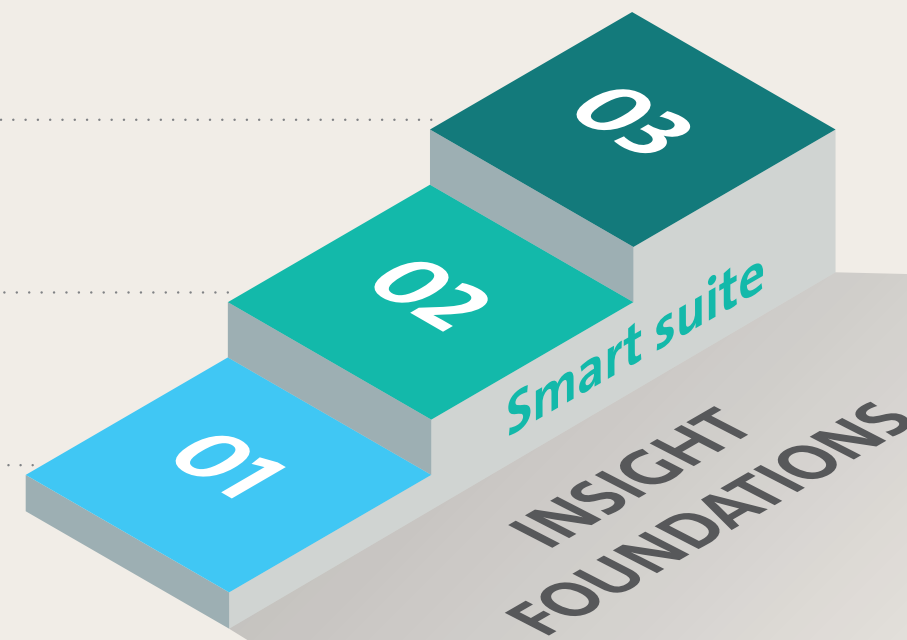
New vision for your water treatment

AQUAVISTA™ DIGITAL SERVICES

Prescriptive Analytics
What should we do?

Predictive Analytics
What might happen?

Descriptive Analytics
What has happened?



AQUAVISTA™ SMART Membranes

	What we offer?	Benefits
DESCRIPTIVE ANALYTICS	FOULING KPIs & SMART ALERTS CLEANING KPIs	<ul style="list-style-type: none"> ■ Situation awareness ■ Reduced downtime ■ Reduced operating costs ■ Extended lifetime of membranes ■ Improved water environmental footprint ■ Meeting production targets ■ Empower your personnel by monitoring Clean-in-place efficiencies
PREDICTIVE ANALYTICS	PREDICTIVE MAINTENANCE FOR MEMBRANES	<ul style="list-style-type: none"> ■ Optimized maintenance schedules ■ Enhanced stock management of spares and chemicals ■ Meet production targets with less risk ■ Minimize curative maintenance ■ Peace of mind



Al Dur 2 and Rabigh 3

Veolia taking part in two major desalination projects in the Middle East

SIDEM is taking part in two new desalination plant projects in Saudi Arabia and Bahrain, for ACWA Power. These two contracts have a combined value of over 323 million US dollars (over 285 million euros).

ACWA Power is a developer, investor and operator of a portfolio of power generation and desalinated water production plants. The company operates, is building or in advanced development of 50 assets throughout the Middle East and North Africa, Southern Africa, and Southeast Asia regions. It currently employs over 3,500 people across 11 countries.

On the one hand, Veolia will be in charge of engineering and procurement for the pre- and post-treatment facilities at the Rabigh 3 plant in Saudi Arabia. Veolia will supply advanced technologies for these two key steps of the desalination process. Located 150 km north of Jeddah on the Red Sea, Rabigh 3 will be the largest seawater reverse osmosis plant in the Arabian Peninsula. It has a total capacity to produce 600,000 m³ of potable water per day, which will serve around 2 million inhabitants of the Jeddah and Mecca areas.

The plant will procure water availability and reliability even during high demand periods such as the Holy Month of Ramadan and Hajj seasons. Commercial start of the operations is scheduled for the end of 2021.

On the other hand, the Al Dur 2 IWPP plant, in Bahrain, will produce a total of 227,000 m³ of drinking water per day, the equivalent consumption of 600,000 people. Veolia will provide for engineering, procurement, and construction of the desalination plant, which will integrate combined cartridge and media filters, an innovative proprietary technology that will allow a smaller footprint of the facilities. Moreover, using Veolia's reverse osmosis processes, this project will associate seawater desalination and power production to reduce the cost of drinking water. Start of operations is scheduled in phases from the end of 2020 to June 2022.

For Jean-Francois Nogrette, Senior Executive Vice President Technologies & Contracting at Veolia, these new contracts confirm Veolia's position as a leader in desalination and the reference partner for stakeholders in

the Middle East. He stated: *"Veolia's unique expertise and technology were the deciding factors in meeting the requirements of these clients and bringing down the cost of water production. We are honored to be working with ACWA Power and our other partners on these major infrastructure projects to support the development of Saudi Arabia and Bahrain, and serve their populations"*.

Vincent Baujat, EVP Water Technologies Middle East for Veolia and Managing Director for SIDEM, explained why technological development is so important to the company: *"We develop new technologies to optimize the treatment steps necessary to produce drinking water from seawater, and to improve the durability and the performance of reverse osmosis membranes. It is important to us to offer compact and reliable solutions, able to supply water at a competitive price, while reducing environmental impacts, and that is what we will do for ACWA Power"*.

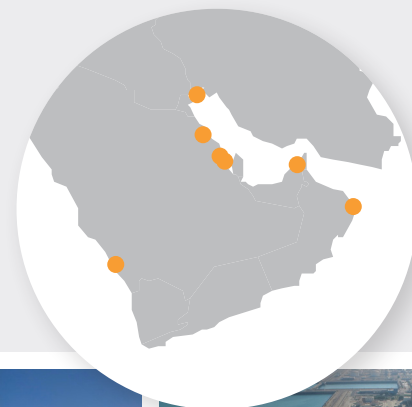
With project development and operations in the Middle East for over 40 years, Veolia is particularly involved in desalination projects. With a total treatment capacity of approximately 13 million m³ of water per day at more than 2,300 sites in 108 countries across the world, Veolia is the world leader in desalination. These two new contracts reassess Veolia's strong position and the company's leadership in this market. ■





OUR REFERENCES

- RABIGH PHASE 3 IWP, SAUDI ARABIA (1)**
 Reverse Osmosis – Seawater
 Type of Contract: IWP, SIDEM as EP contractor for the pre & post treatment plants
 Signed in 2019
 Capacity: 600,000 m³/day
- AL DUR PHASE 2 IWPP, BAHRAIN (2)**
 Reverse Osmosis – Seawater
 Type of Contract: IWPP, SIDEM as EPC contractor
 Signed in 2019
 Capacity: 227,000 m³/day
- BASRAH BWRO, IRAQ (3)**
 Reverse Osmosis – Brackish Water
 Type of Contract: Design and Build + 5 years O&M
 Capacity: 199,000 m³/day
 Contract date: 2014
- SADARA MARAFIQ, SAUDI ARABIA (4)**
 Reverse Osmosis – Seawater
 Type of Contract: Design, Build, Operate (10 years)
 Capacity: 179,000 m³/day
 Start-up date: 2016
- AZ ZOUR NORTH PHASE 1 IWPP, KUWAIT (5)**
 Multi Effect Distillation
 Type of Contract: Design and Build
 Capacity: 490,000 m³/day (10 evaporators)
 Start-up date: 2016
- SUR IWPP, OMAN (6)**
 Reverse Osmosis – Seawater
 Type of Contract: Design and Build
 Capacity: 84,000 m³/day
 Extension: 48,000 m³/d
 Start up date:
 Main plant: October 2009
 Extension: December 2016
- JUBAIL IWPP, KSA (7)**
 Multi Effect Distillation
 Type of Contract: Design and Build
 Capacity: 800 000 m³/day (27 evaporators)
 Start up date : 2010



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